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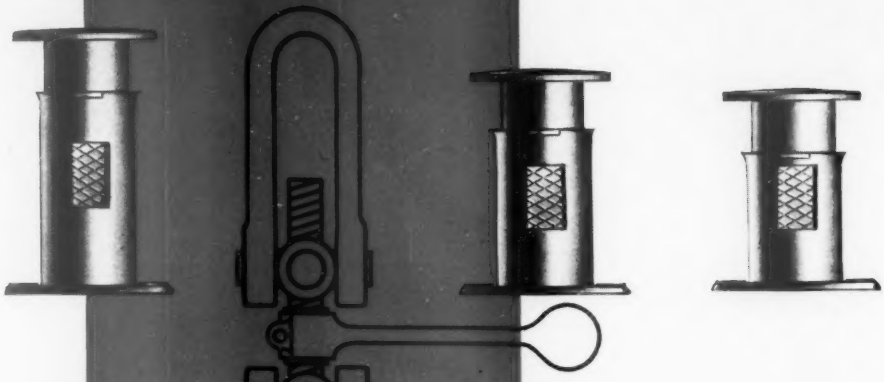

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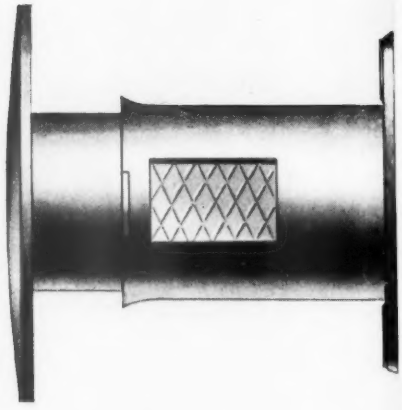

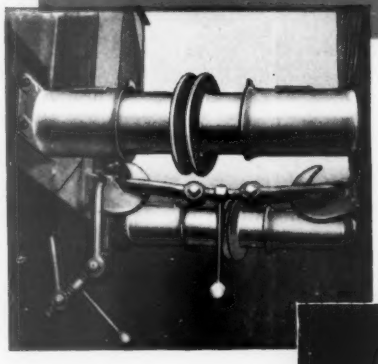

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An index to the 109th volume of THE RAILWAY GAZETTE, *covering the issues from July 4 to December 26, 1958, has been prepared, and is now available free of charge on application to the publisher.*

Stimulating Industrial Activity

THE concessions to the value of £366 million a year in the Budget introduced on Tuesday by Mr. D. Heathcoat Amory, Chancellor of the Exchequer, should go far to achieve their object of restoring economic expansion. British Railways and the other nationalised transport undertakings will benefit from the stimulus to economic activity from greater public spending power. The restoration of allowances in the form of conversion of a large part of the initial allowance on industrial capital expenditure into investment allowances, is a fillip to industrial production. Income tax reliefs and payment of post-war credits should increase private investment. They afford a valuable opportunity of investing to develop overseas territories of the British Commonwealth. In so far as they directly increase public spending power they will probably encourage passenger travel. London Transport and the provincial and Scottish road passenger undertakings of the British Transport Commission are likely to benefit to the extent of more than £1,000,000 through remission of excise duties on buses and motorcoaches. The termination of the tax on the chassis of commercial vehicles will directly assist British Road Services and British Railways in replacement and any increase of their road delivery fleets. It must also increase competition from road hauliers, and, probably, "C"-licence transport. The main object of the budget is to increase the competitiveness of the national economy. Gratification at concessions which directly benefit individuals must not obscure the fact that the economic position demands vigilance, personal effort and self discipline from the British people. As the Chancellor has pointed out, this country is encountering increasing competition in the export trade on which it depends for its existence. Prices must be kept down, which involves self-discipline on the part of organised labour, to ensure wages restraint. The Budget will do much to stabilise prices and avoid inflation. As a means of ensuring prosperity it is intended largely to stimulate purposeful and sustained efforts in industrial production.

Mr. F. Q. den Hollander

THE career of Mr. F. Q. den Hollander, President of the Netherlands Railways, whose retirement was recorded in our April 3 issue, was closely associated with the railway systems of Great Britain, and other countries, as well as those of Holland. His ability and versatility were shown during twenty years with the Netherlands Indies State Railways, where he held senior appointments in both engineering and operating positions. These experiences, broadened later by executive responsibilities on the Netherlands Railways, and ministerial appointments in the government of his country, made him well suited to hold, for twelve years, the position of President of the Netherlands Railways. It is typical of his active interest in international transport affairs that he should accept, in 1955, an invitation by the British Transport Commission to become a member of its Technical Development & Research Committee. His advice was highly valued by that body, but perhaps his greatest accomplishment was in connection with the re-organisation, after the war, of the railways of Europe, to which reference is made in a special contribution by "J. E." on another page. A biography of Mr. den Hollander appears elsewhere in this issue.

Transport Wage Claims

THE claim for a substantial wage increase forwarded on April 2 to the British Transport Commission by the National Union of Railwaymen may be followed by a new bus campaign for higher pay or shorter hours. Strategy and aims will be discussed at a meeting on April 14 of the national committee of the busmen's section of the Transport & General Workers' Union. Despite the fate of the recent claim made by the engineering unions, it appears probable that the busmen will press for a shorter working week. They feel that they should share in the benefits accruing from the improved operation which has taken place since working hours last were reduced in 1947. Bearing in mind the fact that a shorter working week almost invariably means a rise in wages without a corresponding rise in productivity, the following quotation from the Treasury's Economic Survey of 1959 holds particular interest: "If wage rates . . . go on rising on the same scale as in 1958, without a corresponding increase in productivity, the near-stability of prices recently achieved would be threatened."

Railway Students' Jubilee Celebrations

LAST weekend marked the Golden Jubilee of the Railway Students' Association, to which we referred at some length in last week's issue. On Friday, April 3, Mr. A. B. B. Valentine, President of the Association, took the chair at a dinner given at the London School of Economics & Political Science, at which Sir Sidney Caine, Director of

the School, proposed the health of the Association. On Monday evening the annual dinner and dance was held at the Chatham Rooms, Victoria Station, and after Mr. G. J. Ponsonby, Sir Ernest Cassel Reader in Commerce with special reference to transport, London School of Economics & Political Science, London University, had proposed the health of the Association, Mr. David Blee, who is a Brunel medallist of the Association and a former President, responded. The toast of the ladies and visitors was proposed by the President, Mr. Valentine. The attendance at this dinner was a record and was a fitting climax to the celebrations, which had included a weekend of activities in which representatives from several Continental railways had participated. During the weekend it was announced that Mr. H. C. Johnson, General Manager, Eastern Region, British Railways, had accepted the invitation to be the next President of the Association.

Third Progress Report

THE Southern Region's third progress report to the public on the rehabilitation of its South-Eastern line surpasses the high standard set by its predecessors. The reader first learns that reconstruction work is almost complete and that after June 1 trains will be able to increase their speeds to 60 m.p.h. on sections previously offering a serious bottleneck. March 13's rush-hour delay at Charing Cross is explained: notice is given of forthcoming exhibitions at 10 stations of new express trains to be run next month: in an interview, an engine-driver refers to the training now being given to enable steam locomotive men to drive the new electric stock on the Kent coast lines: a short diagrammatically-illustrated article gives a good idea of the dense traffic experienced by one small junction; there is a brief exposition of the centralised traffic control coming into operation at Sittingbourne next month, and notification is given of availability of the temporary timetable promised last month. This broadsheet deserves the highest praise. There is no doubt that its eventual cessation will be greatly regretted by many passengers on the Region.

Overseas Railway Traffics

CANADIAN Pacific Railway revenue for February amounted to $36,129,672 compared with $33,990,522 in February, 1958. Railway expenses were $35,413,348 ($33,608,038) resulting in net earnings of $716,324 ($382,484). Aggregate net earnings for the two months January-February, 1959, were $1,027,177, compared with $960,840 in the corresponding period of 1958. Operating revenues of the Canadian National Railways for the same month amounted to $55,227,000. Expenses, taxes, and rents totalled $59,229,000, resulting in a net operating income deficiency for the month of $4,002,000. In February, 1958, operating revenues were $52,242,000; expenses, taxes, and rents were $57,982,000, and the net operating income deficiency was $5,740,000. East African Railways & Harbours approximate railway revenue for the month of February was £1,581,000 compared with £1,582,000 in February, 1958. The total railway revenue for the two-month period January-February was some £3,447,000 compared with £3,348,000 during the same period last year, an increase of £99,000. Passenger receipts in February decreased by £5,000 in comparison with the same month last year, but earnings from goods traffic showed an increase of £31,000.

Nigerian Railway Extension

A PAPER, "A project for extending the Nigerian Railway into Bornu Province," of considerable interest to railway engineers, will be read before the Institution of Civil Engineers on April 28. The author, Sir Ralf Emerson, Chairman of the Nigerian Railway Corporation, will describe the extension which leaves the existing line at Kuru Station, on the Jos Plateau, eventually extending eastwards, for 400 miles, to Maiduguri, capital of Bornu Province. The first 108 miles from Kuru, 4,060 feet above sea level, to Bauchi, 1,990 feet, is under construction. The contractors are Stirling-Astaldi Limited, a British-Italian company. The location survey was carried out by the consulting engineers to the corporation, Messrs. Rendel, Palmer & Tritton. Maps showing the detailed topography of a strip, about 1¼ miles wide, covering the proposed route were obtained by aerial photography and photogrammatic mapping, which was carried out by the Air Operating (Aerial Surveys) Co. Ltd., Johannesburg, a company of the Hunting Group. The detail designs for the railway were prepared by Messrs. Rendel, Palmer & Tritton, who are also supervising the construction. A large part of the project has been financed by a loan from the International Bank for Reconstruction & Development (World Bank).

Study Courses for Schoolboys

THE progressive reduction in British Railways staff does not lessen the need for well-trained leaders 15 to 40 years hence. Public and grammar schools are likely sources of good leaders. That does not mean that such men will not be found amongst railwaymen educated at secondary modern schools, for instance, most of whom leave school at an earlier age, and opportunities for promotion are afforded accordingly to secure all possible talent and to ensure fairness. To enable public and grammar schoolboys to see for themselves the kinds of work performed by the principal technical departments of British Railways, with a view to a possible career in the railway service, some Regions again have organised short courses during the Easter holidays. Details are given elsewhere in this issue. In the North Eastern Region there are four courses, devoted respectively to mechanical, electrical, and carriage and wagon engineering; to traffic work, both commercial and operating; to civil engineering; and to the work of the Signal Engineer's Department. The courses are bound to be comprehensive in scope, but are specialised enough to cater for the boy whose aptitudes and inclinations are already known.

Telecommunications for Crewe-Manchester Line

FOLLOWING the successful installation of telecommunication cables for the first two phases of British Railways, London Midland Region, Crewe-Manchester electrification, British Insulated Callender's Cables Limited has been awarded the contract for phases three, four, and five. The electrification of the route is being largely undertaken by the B.I.C.C. group, and a type of specially screened telephone cable will be used as on the earlier phases. The cables are sheathed with aluminium and lapped with heavy steel tapes for electro-magnetic screening against induction from the 50-cycle a.c. traction system. The screening depends on effective arrangements for earthing which have so far been provided by deep-driven copper rods. The use of drawn seamless aluminium sheaths for telephone cables is relatively new and the cables of this type installed on the Crewe-Manchester line are the first ever to be installed on British Railways. The work called for under the new contract covers the remaining main cabling between Wilmslow and Manchester and in the environs of Crewe Station itself, and virtually completes the Crewe-Manchester telephone cable system.

Electric Stock for Kent Coast Line

THE whole of British Railways, Southern Region, Kent Coast electrification scheme will require 112 four-car express and 108 two-car intermediate electric multiple-unit sets besides 24 electric locomotives. Of this total 53 four-car units will run on express services for phase I, and 62 two-car units on intermediate services. They are described elsewhere in this issue. All the multiple-unit sets have identical electrical equipment of a new type using cam-operated notching contactors instead of the hitherto standard unit switches. The traction motors are electrically identical with the standard used since 1951, but have roller suspension bearings so that plain oil lubricator bearings can be eliminated entirely from this stock, mainly

in the interests of maintenance. The coach construction generally is of British Railway standard main-line design, but thermal and sound insulation has been installed. Some of the express units will include buffet cars with all-electric cooking facilities. Apart from the accelerated services possible with electrification, the stock should set a new standard of comfort on the Kent Coast services.

Improving Yard Working in India

A GREAT deal of money has been spent over many years by Indian railways on marshalling yards, construction of which is now being accelerated. Not the least costly feature is the mechanical equipment being installed. The Railway Board and the managements of the eight State railways are not satisfied that best use is being made of the facilities provided. Accordingly yard operation committees are to be formed at the headquarters of each railway to study the operation of individual marshalling yards, especially the procedures and targets for optimum working. Instruction of yard staffs with a view to more efficient operation is also to be considered. The committees will consist of senior operating, mechanical engineering, and signalling and telecommunications officers, and will report directly to the General Managers of their railways. One object is to lay down uniform procedure.

Inventor of the Lartigue Block

AN article by the signalling historian, Monsieur Charles Lecomte, in our contemporary, *La Vie du Rail*, relates the life of Henri Lartigue, remembered today for his "electro-semaphore" block seen along the former routes of the Northern Railway of France and used also by the old Eastern and Orleans companies in that country and by the Nicholas Railway in Russia. Born in 1830 Lartigue, after some years in teaching and scientific work, entered the service of the Chemin de fer du Nord in 1856 and soon after became assistant to Paul Tesse, the Telegraph Superintendent. In collaboration with him and an electrical manufacturer, Pierre Prudhomme, he elaborated in 1872 the block apparatus ever since known by his name. In the same year he produced, in association with a colleague named Forest and industrialists named Digney, the cab signal apparatus which came to form the basis of the equipment now so widely used in France. In 1873 the Nord decided to apply the Lartigue block between Paris and Creil and in 1876 it was brought to the notice of all the French railways officially by the Government. In 1880 Lartigue left the railway service to join the telephone industry. He died in 1884. His brother Charles was the originator of the Lartigue monorail used on the now defunct Listowel & Ballybunnion Railway in Ireland.

Features of the Lartigue System

IN approaching what may be called the interlocking block problem Lartigue conceived the idea of making the block apparatus itself large enough to be seen by the driver. Once this fact is grasped there is no difficulty in understanding the working. The semaphores are nothing more than two-position block instruments, operated on double lines on the "normally clear" principle, as originally with the Preece block on the former L.S.W.R. The difference is that while the signalman in the rear places his semaphore to danger, it is the man in advance who clears it again by sending an electrical impulse. For the controlling mechanism Lartigue took the polarised electromagnet of the printing telegraph inventor, David Hughes, devised expressly to enable a small electrical effect to release a large amount of mechanical work. This very efficient device became used also in the Sykes lock-and-block. The Northern Railway of France added to the original equipment electrical interlocking between the distant signal and the semaphore mechanism and sequential control between the sections, with facilities for a stationmaster to interrupt it where, for example, trains could be shunted or divided. With such a system the semaphores are pure block signals and others must be provided to cover interlocking functions.

Modernisation Plans in Perspective

THE word "modernisation" continues to be used loosely of railways, and more especially of British Railways, when it is often applied to new works and new equipment of any kind. Major-General Ll. Wansbrough-Jones, Secretary General of the British Transport Commission, has performed a useful service in defining the term in his paper "Modernisation of Railways in Perspective" which he read to the Railway Students' Association last Saturday at the London School of Economics during the Association's Golden Jubilee celebrations. Before the war of 1939-45, he points out, the usual term was railway "development." Railway managements have always tried, as far as their financial situation allowed, to keep abreast of developments. Modernisation, he believes, reflects the sustained intensity of this process of keeping abreast, and suggests a deliberate concentration of effort, perhaps even before the plant or equipment, whether fixed or moving, replaced has reached the end of its useful, or economic, life. Modernisation, therefore, is interpreted by him as "a comprehensive and concentrated scheme, deliberately preplanned and aimed at equipping, in its widest sense, a railway system to undertake tasks which have grown different in character as more competition has appeared on the scene, and also to ensure that the railway can make the contribution due from it to the economic life of the country." He uses "equipping" advisedly in this context, and stresses that the modernisation scheme published in 1955 was called "Modernisation and Re-equipment of British Railways."

There has been nothing comparable in scope with this before. Electrification of main-line railways in Britain before the first world war was largely experiments in traction. Reviewing activities on railways in several countries between the wars and since the war of 1939-45, Major-General Wansbrough-Jones mentions *inter alia* the electrification of most of the Swiss Federal Railways and main-line electrification on the Great Indian Peninsula Railway. None of these schemes, although concerned with many miles of line and involving heavy expenditure, was as comprehensive in scope as the present British Railways scheme, which includes much besides changes in the modes of traction. A far-reaching modernisation project initiated by the Netherlands Railways has involved replacement of steam by electric and diesel traction and reduction in the volume moved by rail of goods traffic more suitable for other modes of carriage, and a considerable reduction in mileage. One of its most striking features has been its implementation to a time-table, and the completely new thinking which has accompanied the introduction of modern equipment and techniques. The results have been remarkable increases in passenger traffic and in productivity.

The British Railways plan, Major-General Wansbrough-Jones states, embraces the whole range of worth-while service, technical equipment, research and development, with each feature playing its balanced part. It is, he claims, a re-birth of the railway industry, but it is selective in its objectives. It is related not only to "the full utilisation of modern equipment" but also to "a purposeful concentration on those functions which the railways can be made to perform more efficiently than other forms of transport." It provides, *pari passu* with the placing in service of new equipment, for the streamlining of the traffic organisation, the modernisation of the goods charging system, and increasing productivity through modern methods of analysis and work study.

Since the plan was launched in 1955, British Railways have placed over 100 diesel locomotives in main-line service, and nearly 800 diesel shunting engines, and have electrified nearly 100 miles of line. Passenger services in many parts of the country have benefited by the introduction of some 2,400 diesel multiple-unit vehicles, more than 1,000 electric multiple-unit vehicles, and nearly 4,000 locomotive-hauled passenger coaches have been built. On the freight side, the proportion of brake-fitted trains has been increased by 55 per cent, and nearly 215,000 wagons of new types have replaced 315,000 older

wagons. Streamlining of freight operations has facilitated closure of 40 marshalling yards and nearly 200 goods depots. In the field of signalling, modernisation and rationalisation have enabled 250 signalboxes to be closed, and automatic warning control has been fitted to 600 miles of track. Computers, radio and radar are among other modern techniques now harnessed to railway work, in which work study and organisation and methods are also bringing increasing benefits. In reviewing what has been done, account must be taken of inevitable delays in starting and of the deceleration in implementation necessitated by financial stringency.

Canadian National Railways Developments

THE development of the Canadian National Railways and the way in which they are improving their services are ably described in a recent address by Mr. J. C. Kenkel, European General Manager of the C.N.R., to the London Freight Club. Among many features he mentions is the growth of the system. The route mileage and trackage are steadily being increased. Trackage, now about 33,700 miles, is growing at the rate of 80 miles a year. New route mileage is opening up new wealth in the Canadian hinterland. In the recent past the undertaking has built 52 miles into Chisel Lake for copper and other metals, 46 miles into Kitimat for aluminium, 31 miles to the Hudson's Bay Company Thompson Mine, 150 miles into Lynn Lake for nickel, copper, and cobalt, 27 miles into Manitouwadge for uranium, 161 miles into Chibougamau to open up the country for many minerals and forest products, and another 133 miles from Chibougamau on to Lake St. John to open up even more country for the same resources. In the Maritime Provinces, a new line 23 miles long to tap the important copper deposits of Heath Steele. This represents some 600 miles of totally new track in totally new territory.

Throughout Canada the Canadian National Railways operate not only railways but, inter alia, steamships, ferries, hotels, summer resorts, telegraphic services, grain elevators, stockyards, bus and road haulage services, warehouses, and fruit traffic terminals. They own mineral rights over 3,000,000 acres, oil properties, and all the stock of Trans-Canada Air Lines. The C.N.R. European Organisation has its own staff in London, Liverpool, Glasgow, Paris, Antwerp and Copenhagen, from which bases it maintains an organisation throughout the United Kingdom and some 15 countries on the Continent to deal with goods, parcels and passenger traffic, including emigrants, and related activities. The undertaking is also in a position to give advice on the establishment of new industries in Canada.

The many problems of a railway in such a vast area such as Canada, Mr. Kenkel points out, include extreme range or temperature. Some cargo needs the maintenance of even temperatures irrespective of the weather, as for instance the use of natural or artificial refrigeration during warm weather, and coal heaters during other seasons of the year. Some perishable traffic are hauled more than 4,000 miles, with transit times of a week or more. The problem is accentuated when they originate in, say, California, with temperatures of over 80° F., and arrive in Montreal in temperatures below zero. During the last few months, the journey times from Saint John and Halifax to Montreal and Toronto have been cut by 24 hr., with similar saving in time from Montreal and Toronto to all major cities in Western Canada. All trains in the Atlantic Region and on the South shore of the St. Lawrence river west to Montreal are now diesel hauled. Except for one or two steam-operated trains, all C.N.R. lines in Northern Ontario, Quebec, and British Columbia have been made over to diesel operation. At the end of 1958, 85 per cent of freight train miles, 95 per cent of yard locomotive miles and 77 per cent of passenger car miles were diesel worked. Electronic data processing circuits for the transmission of wagon records and the make-up of goods trains are now functioning, and mechanical data units covering many phases of operations are being introduced.

Geography and climate have combined to determine the physical characteristics of railways in Canada. Their influence is shown in wagons which have an average carrying capacity of 44 tons, and passenger vehicles must be robust enough in construction to travel continually over mountains and across prairies in all kinds of weather, besides affording a high degree of comfort. Snow constitutes a real challenge. Conditions vary much across the Dominion. In the Maritimes, for instance, the snow is generally wet and sticky, in Northern Ontario and Quebec, light and powdery, on the Prairies wind sweeps the snow into hard-packed drifts, and in the Rockies snow slides are frequent. This is one of the many problems of operating, motive power, and civil engineering staff.

As regards service by the C.N.R. of the U.S.A., the natural and historic gateway to the Middle West remains the St. Lawrence River. Whilst the St. Lawrence Seaway is expected to attract some traffic away from the C.N.R., the expansion of industrial development in the adjacent area and the availability of cheaper power between Montreal and Toronto should result in additional business for the railways. The enlargement of this gateway into the heart of North America, Mr. Kenkel observes, will create a new Mediterranean Sea, linked with the outside world through the Sea Canal. Around its shores and to the new industries of the St. Lawrence Valley, the railways will undoubtedly continue to be of service in the movement of manufactured articles, mass products, and mass raw materials. The railways can attract traffic by giving a speedy service, the possibilities of which the C.N.R. management has always before it.

Polish Modernisation Plans

DESPITE improved operation and extension of electric traction, the Polish State Railways are faced with many difficulties. Steam remains the principal motive power. With efforts directed to the design and acquisition of electric and diesel motive power and rolling stock and to provision for their maintenance and repair, a large proportion of the steam locomotive fleet is over-age. This applies also to goods wagons, which are of a multiplicity of types largely no doubt because many have been taken over from the German and other railways. A great deal is being done to enhance use of motive power and rolling stock which already is estimated to have saved the purchase of 600 locomotives and 80,000 wagons. The total load per wagon averages 1,334 tons a year, against 700 tons before the war of 1939-45, and the total tonnage of freight hauled by each locomotive 123,000 tons a year, against 68,000 tons. During 1957 average wagon turnround was cut by 2½ hr.; the average speed of goods trains was increased by 4 per cent; and economies in fuel consumption saved 450,000 tons of coal.

Since 1957 the railways have been operated at a deficit, partly because of increased costs of rolling stock and materials, and partly because of the continuance of unduly low freight rates. In the first half of 1958 there was, for the first time, a shortfall in freight tonnage compared with the estimate. Traffic did not offer. According to Mr. Witold Dowiatt in an article in *Przeglad Techniczny*, the pursuance by the Government of a new agricultural policy and increased economic activity in small towns has resulted in the growth of small consignments from and to many smaller stations, the movement and handling of which traffic are costly.

Passenger traffic today is four times the pre-war volume. The number of passengers moved by each passenger vehicle in a year averages 94,000; the average daily mileage of a passenger coach rose from 106 in 1938 to 194 in 1955. Fares are reported to be too low, and a large proportion of journeys are at concessional rates. Only 7·5 per cent of all journeys are over 65 miles, and 83 per cent are less than 30 miles. Lack of good roads and of country services appears to favour the railways. One difficulty in providing passenger services is the compatibility of fast long-distance services with the frequent stops demanded by largely rural communities. In the past 20 years the number of passenger stations and halts has been increased from 700 to 1,700, which aggravates the operating problem.

The increases in agricultural production envisaged under the 1961-65 Five-Year Plan will intensify the demands on the railways, and rolling stock may well prove insufficient. Extension of electric and diesel traction will assist, by reducing journey times and turnround. Local conditions favour electrification. Some 56 per cent of all traffic is concentrated on 15 per cent of the whole system. The Katowice Divisional Management moves about half the total volume of freight on the whole State Railways system. The 1956-60 Five-Year Plan provided for electrification of about 550 miles, of which 220 were converted in 1956-58 and another 220 are expected to have been electrified by the end of next year. Failure to achieve the target is largely due, Mr. Dowiatt states, to shortage of materials, especially copper. There are also far-reaching plans for modernisation of signalling.

The 1956-60 Five-Year Plan is a transitional phase between post-war reconstruction and modernisation, which latter will be embarked on with the 1961-65 plan. The second plan provides for increases of 10 per cent in goods and of 2·5 per cent in passenger traffic. To deal with this, electrification is proposed of 650 miles, including completion of conversion in the Warsaw suburban area. In conjunction with the building of the central passenger station in Warsaw, some 65 miles of line are to be doubled. New lines are to be constructed to facilitate movement of coal from mines in Silesia and to shorten the route from Warsaw to Wroclaw (Breslau) by about 35 miles. Motive power to be acquired includes no steam locomotives. The plan provides for purchase inter alia of 222 electric locomotives, 264 three-car and 8 long-distance four-car multiple-unit electric sets, 750 diesel locomotives, 310 diesel railcars, 2,000 passenger coaches, and 40,000 goods vehicles. The Government is stated to be taking steps to ensure that materials will be available for implementing this plan.

British Transport Commission Traffic Receipts

A SLIGHT increase in British Railways passenger receipts for Period 3, the four weeks ended March 22, and higher receipts from provincial and Scottish buses, ships (passengers), and British Railways parcels services may occasion a little comfort, but the situation generally as regards the traffics of the British Transport Commission is most disquieting. Receipts will have to be much higher, and that soon, if the Commission is to achieve financial equilibrium in the reasonably near future.

	Four weeks to March 22, 1959		Incr. or decr.	Aggregate for 12 weeks		Incr. or decr.
	1959	1958		1959	1958	
	£000	£000	£000	£000	£000	£000
Passengers—						
British Railways	8,839	8,666	+ 173	25,448	25,172	+ 276
London Transport:						
Railways	1,827	1,826	+ 1	5,477	5,449	+ 28
Road services	4,138	4,435	− 297	11,926	13,188	− 1,262
Provincial & Scottish buses	4,093	4,073	+ 20	12,020	12,103	− 83
Ships	226	207	+ 19	694	624	+ 70
Total passengers	19,123	19,207	− 84	55,565	56,536	− 971
Freight, Parcels & Mails—						
British Railways:						
Merchandise & livestock	7,805	8,598	− 793	22,698	25,505	− 2,807
Minerals	3,496	3,934	− 438	10,486	11,861	− 1,375
Coal and coke	9,743	10,641	− 898	29,946	32,333	− 2,387
Parcels, etc., by passenger train	4,169	4,120	+ 49	11,845	11,796	+ 49
Total Freight British Railways	25,213	27,293	− 2,080	74,975	81,495	− 6,520
Others	4,197	4,204	− 7	12,019	12,185	− 166
Total Freight, Parcels, & Mails	29,410	31,497	− 2,087	86,994	93,680	− 6,686
Total	48,533	50,704	− 2,171	142,559	150,216	− 7,657

The drop in London Transport road service takings is in accordance with the trend already apparent. The higher receipts from buses in Scotland and the provinces seem to have been caused by good weather. The continued high level of ships' passenger receipts is gratifying, more particularly in March, out of the holiday season.

Railway merchandise, mineral, and coal and coke receipts during Period 3 were not only below the level for the corresponding period of 1958, but also less than for the preceding four weeks. The drop in coal class traffic was foreseen. More serious, because it is an indication of industrial activity, is the decline in mineral receipts. These were £3,496,000 for Period 3, compared with £3,934,000 a year previously, and with £3,542,000 for Period 2 of the current year, which in turn represents a drop compared with £4,013,000 for Period 2 of last year. In view of the reported recovery in industrial activity, better results were expected from mineral traffic for the four weeks ended March 22. The reasons for the decline in merchandise traffic appear to include the growth of "C"-licence transport.

Aggregate traffic receipts of the Commission for the first 12 weeks of the current year at £142,559,000 are £7,657,000 below the 1958 figure, which itself was 6·5 per cent below the aggregate for the first 12 weeks of 1957.

PERCENTAGE VARIATION 1959 COMPARED WITH 1958

	Four weeks to March 22	12 weeks to March 22
British Railways—		
Passengers	+ 1·9	+ 1·0
Parcels	+ 1·1	+ 0·4
Merchandise & livestock	− 9·2	− 11·0
Minerals	− 11·1	− 11·5
Coal & coke	− 8·4	− 7·3
Total	− 5·3	− 5·8
Ships (passengers)	+ 9·1	+ 11·2
British Road Services, Inland Waterways and Ships (cargo)	− 0·1	− 1·3
Road Passenger Transport, Provincial & Scottish	+ 0·9	− 0·6
London Transport—		
Railways	—	− 0·5
Road services	− 6·6	− 9·5
Total	− 4·7	− 6·6
Aggregate	− 4·2	− 5·0

Southern Region Summer Train Services

THE outstanding feature of the Southern Region summer timetable, in operation from June 15, is the revolutionary improvement in the Kent Coast service, resulting from electrification. Compared with the present steam service, during the off-peak hours the times of the hourly expresses from Victoria will be cut by an average of 31 min. to Herne Bay, 36 min. to Margate, and 42 min. to Ramsgate. Acceleration on such a scale has seldom been effected in one single timetable change. With the morning and evening business trains, which are already fairly fast, the cuts in time are not quite as great; even so an average reduction of 15 min. between Cannon Street and Herne Bay, 18 min. to and from Margate, and 23 min. to and from Ramsgate is substantial.

The service is on an even-interval basis. Hourly from 7.40 a.m. to 10.40 p.m. an express will leave Victoria, calling at Bromley South and Chatham (44 min.) to Gillingham, where it will divide. The fast portion will continue non-stop to Whitstable (75 min.) and Herne Bay (81 min.), calling thereafter at all stations to Margate (100 min.) and Ramsgate (114 min.). Each hourly train thus will be faster than the quickest of the business trains today (the 5.14 p.m. from Cannon Street, taking 101 min. to Margate and 120 min. to Ramsgate). The second part of each express will proceed to Sittingbourne, Faversham, Canterbury East (88 min.), and stations to Dover Priory (114 min. from Victoria). As these hourly services will be faster to Dover than all but five of the steam-hauled trains by the shorter route via Ashford, it is surprising that the former are not included in Summary Table 2 of the London-Folkestone-Dover service in the timetable book.

Also at 40 min. past each hour trains will leave Charing

Cross for Woolwich, Dartford, Gravesend, Strood, Rochester, Chatham and all stations to Ramsgate. With the London expresses these will provide a half-hourly service between Herne Bay, Margate and Ramsgate, and a direct service between Gravesend line stations and the Kent Coast. Connecting with these at Faversham will be hourly all-stations trains from Sheerness to Sittingbourne, Canterbury East, and Dover, which will both give an hourly service from Sheerness to the Kent Coast and also help with the second sections of the London expresses. to provide a half-hourly stopping service between Faversham, Canterbury and Dover. In addition, the existing hourly stopping trains from Victoria at 16 min. past the hr. will start one min. earlier and be extended from Gillingham to Sheerness, and the second portions of the expresses from Victoria at 40 min. past the hour will have Sheerness connections from Sittingbourne, so that Sheerness also will have a half-hourly service from London.

The fastest train of the day will be the 5.14 p.m. from Cannon Street, calling as now only at Whitstable (65 min.), Herne Bay (72 min.), and stations from Margate (86 min.) to Ramsgate (99 min.), so for the first time on record providing a daily time of less than 1½ hr. from London to Margate. On summer Saturday mornings and afternoons there will be a succession of nine relief trains to the 40 min. past the hr. expresses from Victoria, with first stop at Herne Bay, two taking 87 min to Margate, one 88 min., three 90 min. and three 94 min.; in previous years almost all these reliefs have taken just over 2 hr. to reach Margate. A particular benefit will be the late evening expresses from Victoria at 10.40 and 11.30 p.m. to Herne Bay, Margate, and Ramsgate; at present the last down service is at 9.35 p.m. Buffet cars will run daily in most of the expresses at 40 min. past the hour from Victoria, and the 4.44, 5.14, and 5.44 p.m. from Cannon Street. The up service will follow the same pattern, with the hourly expresses leaving Ramsgate at 10 min. past each hour from 9.10 a.m. to 10.10 p.m., and the connecting Dover services also at 10 min. past; the journey times will be 115 min. from Ramsgate and Dover, 102 min. from Margate, 84 min. from Herne Bay and 45 min. from Chatham to Victoria. The whole Kent Coast timetable is an imaginative and well-planned piece of work. The improved services should attract much traffic.

There are few changes to remark in the rest of the Southern Region timetable. Also in the Eastern Division the principal expresses from Cannon Street to Folkestone and Dover will start at 10 instead of 8 min. past the hour, but continue in their existing times from Tonbridge or Ashford onwards; in the case of the 4.10 p.m. down "Man of Kent" this will restore one 80 min. booking from Charing Cross to Folkestone Central.

The 6.30 p.m. from Waterloo to Weymouth is to call at Winchester at 7.40 p.m., and so will no longer be a 2 hr. train to Bournemouth; the times to Southampton and beyond will be 7 min. later. This year the 11 a.m. "Atlantic Coast Express" from Waterloo is shown to be divided daily from July 21 to September 3, and on Mondays and Fridays throughout the currency of the timetable, besides the usual division into a number of parts on Saturdays. The second portion at 11 5 a.m. conveying the Padstow, Bude and Plymouth sections will call additionally at Axminster.

Signalling and Communications in the U.S.A.

THE railways of the U.S.A. have been passing through a period of considerable difficulty during the last 18 months since the full effects of the recession in the heavy industries, such as steel, reduced their wagon loadings materially and quite unexpectedly in October-November of 1957. Recovery began during the latter half of 1958 but had not gained much impetus by the end of February. The American railways, and their neighbour to the north, the Canadian Pacific, are almost unique in remaining company-owned and -operated. They cannot, therefore, rely on Government assistance, whatever form it may take. Information made public recently by the Interstate Commerce Commission at Washington, D.C., the regulatory body for the U.S.A. railways, served to stress the difficulties of the current situation and also the progress, in at least one sphere of activity, being made in overcoming them.

Indicative of the problems is the bald statement by the Commission that the number of railway employees in December, 1958, at 823,978 was the lowest figure recorded for any month since the statistics were first required by the I.C.C. in 1921. It was also reported that railway revenues in 1957 amounted to 3 per cent of the national income; in 1939, the corresponding figure was 5·7 per cent. The 1958 results when available will certainly reveal a deterioration compared with 1957. Despite this gloomy overall picture, a few large railways in the Middle West and West improved their net railway operating income in 1958. Examples are the Santa Fe, the Burlington, the Great Northern, the Milwaukee, and the Union Pacific. There have been many official statements that the turnover to diesel operation has saved many railways from bankruptcy, and there are good reasons in support of these.

Developments in signalling and communications have done much to improve the financial situation of the railways by making possible economies and increasing efficiency. Each year the I.C.C. issues its "Tabulation of Statistics" relating to signalling and train communication systems. The data are compiled by its Bureau of Safety & Service. Like much American railway information it is issued with commendable promptitude and the figures appertaining to the beginning of 1958 were available at the close of that year. Some of the tables set out in this booklet give the statistics for each of the individual railway companies. The route mileage of the Class I railways at the end of 1957 was 222,177. The total length of railway in the U.S.A. operated under the block signal system on January 1, 1958, was only 109,895 miles. Of this total 81,743 route miles were automatic and 28,152 route miles were non-automatic. During 1957 automatic mileage increased by 121 and non-automatic fell by 60.

A chart in the statistics booklet shows the trend over nearly 40 years. Whereas the total mileage with automatic and non-automatic block signalling has risen from about 102,500, the non-automatic mileage has fallen from some 62,500 to the figure mentioned above, and the automatic mileage has risen from under 40,000. Some railways have long had block signalling on 100 per cent, or slightly less, of their track mileage; among the larger systems are the Burlington, the Soo Line, the Wabash with 99 per cent, the New York Central with 97 per cent, and the Pennsylvania with 85 per cent. On the other hand the Illinois Central and the Rock Island could show only 45 per cent and the Great Northern 40 per cent of their track-mileage as block-signalled. Route mileage over which train operation was controlled by signal indication without train orders amounted to 27,141. The more usual American method of train operation by timetable and train orders only, was in force on 106,606 route-miles.

A table in the I.C.C. statistics relates to the route and track mileage equipped with automatic train stop, train control, and cab signalling devices, and with the locomotives fitted to work over such sections. The track mileage fitted with automatic cab signal devices was 8,514 and that equipped with automatic train stop devices 14,857.

Two major developments over the last 30 years have been C.T.C. installations which, because of the great number of installations, no longer appear in the I.C.C. "Tabulation of Statistics," and the use of radio to assist with, and control, train operation. One application of radio is communication between wayside stations and the train locomotive, which was used over 95,314 route miles, with 1,019 wayside stations equipped and 1,019 locomotives. Other uses are for yard and terminal working. The number of such installations was given as 657 at the end of 1957, since when there is understood to have been considerable extension. With the great length of the diesel-hauled full-tonnage goods train in conditions prevalent in North America, wireless communication between head and tail ends has proved of great benefit in speeding up traffic movements.

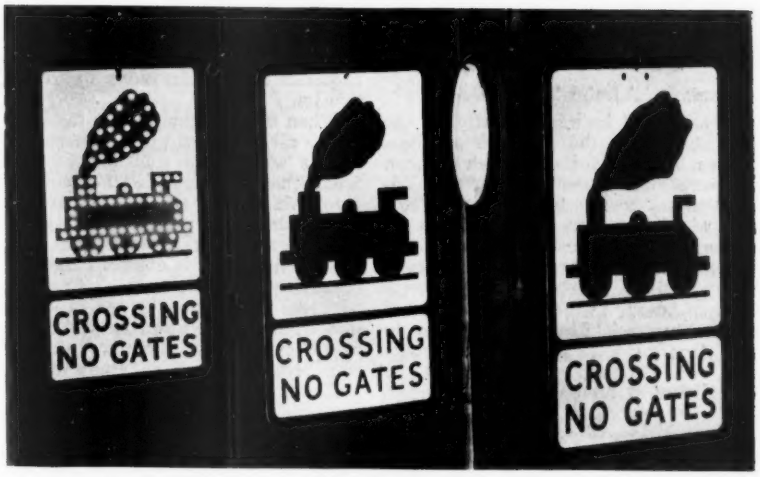
THE SCRAP HEAP

Steel for Oak in Wagons

Since the railway authorities decided to build wagons in steel instead of wood, the demand for oak has fallen and prices have deteriorated.—*"Procurator" in "Country Life" of March 19.*

Level Crossing Road Warning Signs

The road warning signs depicted in the accompanying illustration are in accordance with the newly revised road sign standard, B.S. 873, of the British Standards Institution. The display was by the Minnesota Mining & Manufacturing Co. Ltd. to demonstrate the relative reflective power of the three types: (left to right) button reflectors, reflectorised all over, and painted.



Types of road warning sign with different reflective powers, in accordance with revised British Standard B.S.873

Enlightened Self-Interest Needed

With hard-hitting competitors taking big loads of business away from the railroads, the mystery remains as to why the United States Government continues to regulate the rails as if they held a monopoly in transportation.

Just as great a mystery, in view of the struggles of many railroads to avoid financial ruin, is the failure of railway unions to help their employers in the race for survival. One would think that simple self-interest—the preservation of their own jobs—would inspire the unions to spur crew productivity, eliminate featherbedding and otherwise help hold down spiralling costs that are placing the railroads in a competitive disadvantage.—*From the Topeka (Kansas) State Journal.*

Last Day of M.G.N. Working

The illustration below shows a British Railways Class "4" 2-6-0 locomotive at Yarmouth Beach Station, Eastern Region, on February 28, the last day of operation of Midland & Great Northern line trains to Yarmouth. It may be contrasted with that illustrated in the Scrap Heap of March 20, depicting a M.G.N.J.R. 4-4-0 in 1905 or 1906.

Royal Grandeur in Red Russia

In the hectic succession of parties, airports and ballets [on the Prime Minister's recent visit to Russia] there was one notable respite—the night train from Leningrad to Moscow. It is a celebrated line, along which Tolstoy's characters were perpetually travelling, and on which Anna Karenina committed suicide. . . . But most astonishing was the train itself, which like some other features of the Soviet State had a Royal grandeur scarcely known in the West. It was a special addition to the nightly "Red Arrow," equipped with fittings from Hitler's train, on which wealthier Muscovites escape to the gaiety of Leningrad for weekends.

It moved away from the guard of honour at Leningrad station with quiet dignity, rocking gently on cushiony springs. The wide, carpeted corridors seemed built for Chekhovian arguments. The dining car, serving caviar, champagne and chicken *à la* Kiev, stayed open all night. The bedrooms had showers, cut-glass decanters, tables, reading-lamps and programmes of the journey.—*"Pendennis" in "The Observer."*

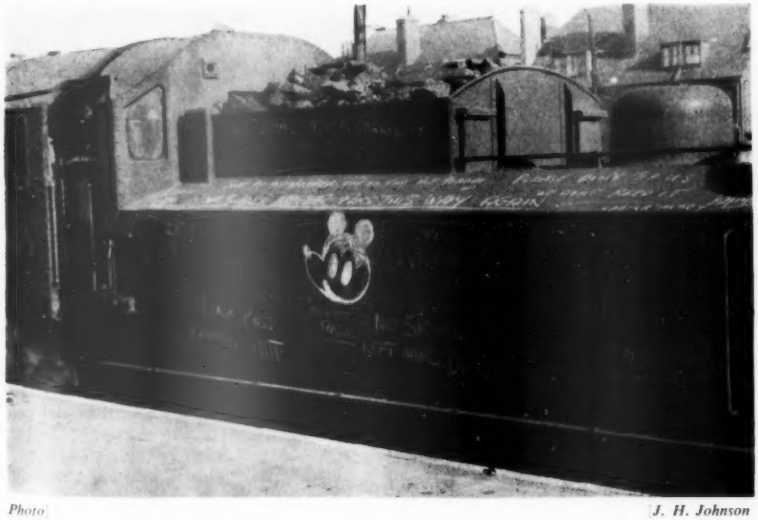


Photo *J. H. Johnson*

At Yarmouth Beach, now closed, on the last day of Midland & Great Northern line working

The First Underground in the U.S.A.

The Rapid Transit Railroad Commission of the City of New York has accepted the proposition of the Witney Syndicate to build an underground railroad in the city. This will be the first underground railroad made in America. The Syndicate has secured for itself a perpetual lease of the underground road, and the work will be taken in hand soon. This is the biggest deal of the kind that has taken place for many years.—*From "The Financial Times" of March 28, 1899.*

Passenger Cover

The Long Island Railroad, which serves business people who travel daily between New York City and their suburban homes has announced that it will lend umbrellas free to any passengers who have left theirs at home on a rainy day. Stocks of umbrellas are to be available at stations for people to borrow and return later on an honour basis, with no deposit required. The railway does not propose to buy new umbrellas for this purpose, but will draw on the never-ending supply of those left on trains by their absent-minded owners.—*From "The Times."*

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

Pretoria Administrative Building

A start will be made shortly on the first section of the £762,000 administrative building for the South African Railways in Pretoria. A sum of £27,000 has been estimated for this section which will house the telephone exchange of the proposed new block. The building will be erected on the site now occupied by Z.A.S.M. House in Paul Kruger Street, former headquarters of the Netherlands Railway Company in the days of the Transvaal republic. Part of the old building will be demolished.

GHANA

Fall in Passenger Traffic

Railway passenger traffic is reported to be further reduced because of the increase in the number of motorcars. At principal stations, figures are now displayed showing the numbers of passengers booked at each station month by month. The total carried on the whole system in 1957-58 was slightly below 6,000,000. First class travel is stated to be affected by the low fares on the internal air services.

RHODESIA

Road-Rail Inspection Vehicle

Rhodesia Railways has successfully adapted an Austin A.35 station wagon for use on either rail or road. The modifications were completed at the Chief Engineer's Central Workshops, Bulawayo. Choice of the type of motorcar was limited by the gauge of the line: any larger model would have required major alterations to the suspension.

When used on the railway the weight of the car is carried by the normal road wheels which also transmit the drive. Small flanged wheels at the back and front which have a 1-in. play are used for guides. At present the change from road to rail or vice versa takes about half an hr. but it is expected there will be an improvement on this. Compared with the conventional type of inspection trolley the Austin road-rail conversion is cheaper and there are additional considerations such as ready delivery and availability of spares.

EAST AFRICA

New Timetable

A new edition of the East African Railways & Harbours pocket timetable has just been published. Apart from containing details of internal rail, steamer, and bus services, timings are given of such trans-continent excursions as from Mombasa to Cairo, Dar es Salaam to Nimule in the Sudan, Mombasa to Kasenyi in the Belgian Congo, and Dar es Salaam to Albertville also in the Congo.

Amongst alterations to major services announced in the new timetable are slightly changed arrival and departure times of the first and second, and second and third class passenger trains between Mombasa and Kampala, and in consequence certain changes in connecting branch line services in Kenya and Uganda. A popular improvement to existing services is the doubling-up on the passenger facilities on Lakes Kioga and Albert and the Albert Nile. This will provide a weekly service, instead of alternative weeks, for passengers travelling on the inland marine services within Uganda and have the effect of diminishing the long waiting list for reservations on the Nile and Murchison Falls package tours.

Austin A.35 station wagon adapted at Rhodesia Railways Bulawayo workshops for use as a road-rail inspection vehicle

INDIA

Assam Rail Link

Strengthening the Assam Rail Link is expected to be completed next year. The work consists mainly of rebuilding bridges with deeper foundations and/or additional waterways, additional protective works, regrading, and so on, to minimise breaches and washouts during the monsoons and to maintain continuity of movement throughout the year.

Wireless Programmes for Passengers

Provision of facilities for passengers to hear All India Radio broadcasts in trains and in station waiting and retiring rooms is understood to be under consideration, but no decision has been announced.

Luggage Lockers at Stations

Lockers are to be provided at principal stations for passengers' hand baggage and other belongings, against payment of a suitable fee. The lockers envisaged are understood to resemble those provided at some large stations in Britain.

Integral Coach Factory

The second shift at the Integral Coach Factory, Perambur, Madras, is to be introduced in the near future. It is expected that about 300 additional steel-bodied coaches a year will be turned out by the factory when the second shift working is fully established.

Checking Beggar Nuisance

Measures being taken to check the nuisance caused by beggars who infest stations and sometimes enter trains include: (1) Special drives with the aid of railway police more particularly at bigger stations; (2) formation of special squads of travelling ticket examiners and members of the Railway Protection Force for combating beggars; (3) special attention by station staff, including the Railway Protection Force, to prevent entry of beggars into railway premises; (4) seeking public cooperation through exhibition of posters, announcements over the loudspeakers, and so on, requesting the public to refrain from giving alms to beggars; and (5) as a long-term measure, replacing all old types of passenger coaches fitted with footboards or exposed frames along their full length, by new coaching stock with footboards only at the entrance, to prevent beggars moving from compartment to com-

partment on running boards along the outside of trains.

The co-operation of State Governments has been sought in intensifying the drive against beggars. The response from the State Governments has been the establishment of homes for beggars and enactment of legislation for control of beggary, and co-operation by the Government Railway Police.

Manufacture of Wagons

Mr. Shah Nawaz Khan, Deputy Minister of Railways, replying to a question in the Indian Parliament, has stated that 20 private manufacturers have been assigned the work of manufacturing railway wagons. The number of wagons manufactured by them in 1957-58 was 17,731. Of the 20 firms, 10 are new companies which have been selected for developing further capacity against the projected increased requirements of the railways. One of the new firms has so far turned out 108 wagons. Two others have put up their first prototype wagon, but have not yet commenced production.

VICTORIA

St. Kilda-Elwood Tramway Closed

The 53-year-old St. Kilda-Elwood tramway service was discontinued after the last trip on February 28. A private bus service now operates between St. Kilda Station and Park Street, Brighton, along the route of the previous tramway service.

The St. Kilda & Brighton electric street railway, opened for traffic in May 1906, was the first successful electric tramway in Victoria. A small system, built in 1889, had run from Box Hill to Doncaster, but after a short period the venture failed and the line was dismantled. First part of the St. Kilda-Brighton line was completed early in 1906. A tramway depot was built at Elwood, and when rolling stock arrived, the line from St. Kilda Station to Park Street, Middle Brighton, a distance of 4 miles 5 ch., was opened on May 7, 1906. On December 22, of the same year, the extension from Middle Brighton to Brighton Beach Station was opened.

UNITED STATES

New York Ferry Service Ended

The New York Central System ferry service over the Hudson between lower and mid-town Manhattan and Weehawken, in New Jersey, was recently closed, after working for 130 years. Although 5,000 passengers were conveyed daily, the ferry for several years had not paid its way, like other ferry services between New Jersey railway termini and New York.

One-level Passenger Fares

The practice of charging a single fare, without the previous distinction between first class and "coach" rates, is spreading. In January the Chicago, Milwaukee, St. Paul & Pacific and Union Pacific Railroads jointly put their Chicago-Denver passenger rates on to a single-fare basis, and the Wabash Railroad has now followed suit between St. Louis and Kansas City, Denver, and (in conjunction with the Union Pacific) Cheyenne. The Wabash fare is uniformly 3 cents a mile, with a 66.6 per cent addition for a return journey as compared with the previous 80 per cent. Over these routes the distinction is between reclining chair card travel, at the basic rate, and parlour or sleeping car accommodation, for which the usual supplementary charges are made varying with the type of accommodation used.

SPAIN

Tourist Office in Majorca

The National Railways has opened a new tourist office at Palma, Majorca. This will function in the same way as the other offices on the mainland, and passengers leaving the island will be able to obtain seat reservations in trains leaving Barcelona, Valencia, or Alicante.

Talgo Train Accelerations

The timing of the Talgo type trains on the international service between Irún and Madrid has been accelerated. This has not affected the connecting French service. The Talgo train now leaves Madrid at 1 p.m. instead of 12.45 p.m. and reaches Hendaye as before at 9.30 p.m. The departure in the reverse direction from Irún remains unaltered at 8.55 a.m., but Madrid is reached at 5.30 p.m. instead of 6.15 p.m.

U.S.S.R.

Battery-Operated Train

A standard electric suburban train operating at Riga has been fitted with batteries to run beyond the electrified lines. The train runs normally on the 27-mile electrified section from Riga to Kemeri and on battery power from Kemeri on to Tukums, another 14 miles.

Publications Received

Railway Carriages and Wagons, Theories and Practices. By L. Lynes. Hampton Court, Surrey: Locomotive Publishing Co. Ltd., Craven House. 8½ in. × 5½ in. 272 pp. Illustrated. Price 35s.—Current practice in design and construction is described against a background of historic facts, with many illustrated references to details standardised by British Railways. The chapter on carriage bodies is mainly concerned with light all-steel welded construction on self-supporting underframes of the girder type. Wood construction also is discussed. A separate chapter gives brief notes on weight-saving by the employment of hollow steel sections and aluminium alloys. There are useful chapters on the theory of design and practice for springs and underframe beams. Notes on design considerations and formulae are given for wheels and axles, bogies, axleboxes, buffing and drawgear, brakes, and so on. Whilst steam heating is dealt with in detail, electric carriage heating has received relatively brief mention. Other subjects, each covered by a short chapter, include maintenance, cleaning and examination.

Indian Railways in 1957-58.—A handbook entitled "Indian Railways: 1957-58" has been published by the Indian Ministry of Railways. It describes in simple, non-technical language different aspects of the working of the railways during the financial year 1957-58. Besides figures relating to the year's performance compared with preceding years, there are some useful appendices. 28 charts, 22 giving statistics from 1938-9 onwards, and a small-scale railway map of India. Copies may be obtained from the Manager of Government Publications, New Delhi.

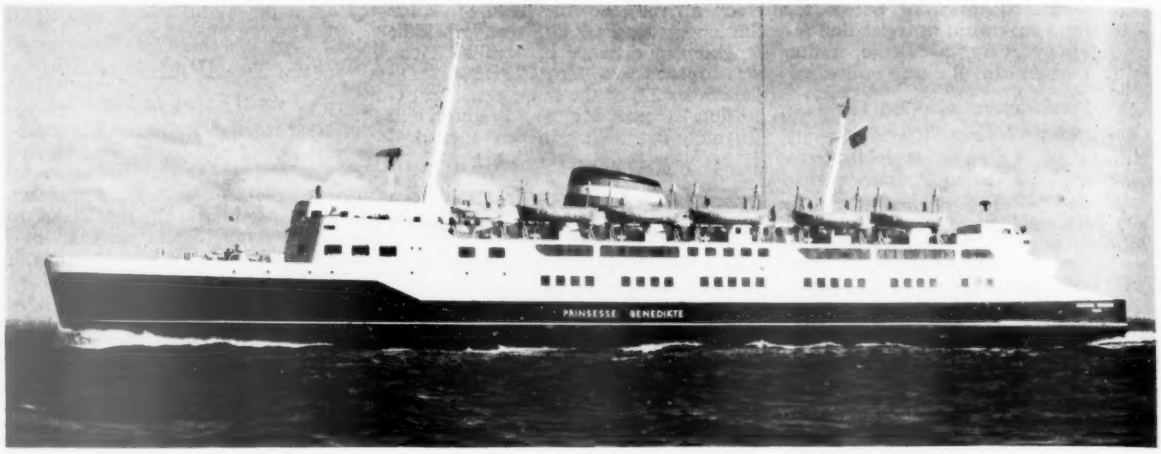
Spectrochemical Analysis.—A 23-page catalogue CH405/2, Direct-Reading Spectrographs, issued by Hilger & Watts Limited, 98, St. Pancras Way, Camden Road, London, N.W.1, is one of a series of five, each dealing with a different aspect of spectrochemical analysis. There are six main sections describing instruments and equipment manufactured by this company. For example, the 3-Metre-Grating Polychromator is stated to be capable of analysing complex alloys in four-six minutes. It has 51 photomultiplier positions and an electronic console with 30 channels. This controls the operating of the instrument and interprets and records the results which are displayed on a panel and printed automatically.

Aluminium Casting Alloys.—The first of the publications to be issued by the Association of Light Alloy Refiners & Smelters Limited is a booklet of 105 pages, entitled "The Properties and Characteristics of Aluminium Casting Alloys." It contains data for all the aluminium casting alloys to British Standard 1490. Besides specification requirements typical properties are indicated and information is given on the physical, foundry and other characteristics of the alloys. There is a section on heat-treatment and a guide to the selection of alloys. It is based on the original A.L.A.R. data sheets, but is published in a more compact form and contains considerably more information. Copies, price 4s. 6d., may be obtained from the Association at 3, Albemarle Street, London, W.1.

Calendar for 1959-60.—We have received a calendar for the year April 1959, to March 1960, from Metropolitan-Vickers Electrical Co. Ltd.

Train and Motorcar Ferry for Danish State Railways

For combined train and road vehicle service: bow propeller to facilitate manœuvring at terminals



Train and road vehicle ferry "Prinsesse Benedikte" for Danish State Railways Korsør-Nyborg and Halsskov-Knudshoved services

TWO ferry services are operated by the Danish State Railways over the Great Belt between the islands of Zealand and Funen. One is the train ferry, which also conveys road vehicles, between Korsør, on Zealand, and Nyborg, on the main line from Copenhagen to the West. The other is the road vehicle ferry between Halsskov and Knudshoved, parallel to the Korsør-Nyborg crossing. A diesel ferryboat, the *Prinsesse Benedikte*, named after the second daughter of King Frederick IX, was placed in service shortly before Easter. The ship was built by the Elsinore Shipbuilding & Engineering Company, for service on either route. At peak periods of road traffic during the holiday season it will work the Halsskov-Knudshoved service. At other times and at night it will carry railway vehicles between Korsør and Nyborg.

The principal particulars are:

	ft.	in.
Length overall	361	3
Breadth over fenders	56	3
Draught	14	9
Displacement	4,650 *tonnes*	
Maximum speed	18·7 knot	

Burmeister & Wain Type 750 VBF engines develop 8,700 h.p. at 200 r.p.m. There are four auxiliary motors, two six-cylinder, and two five-cylinder four-stroke diesel engines built by Frichs S/A. for auxiliary power and lighting.

Bow Propeller

The bow propellor in the fore peak is intended to facilitate manoeuvring, especially when wind and current are unfavourable. It is operated by a 300-h.p. electric motor from either the fore or the after bridge, and gives side pressure of up to 4 *tonnes* to port or starboard. This is believed to be the first time that this device has been fitted in a Danish vessel. If successful, it will be adopted as standard equipment for all Danish State Railways ferryboats.

Passenger saloons and restaurants generally are of standard design, with some improvements. The windows on the promenade deck are much larger than in existing vessels. The first class smoking room, which accommodates 100, is panelled in polished teak, with furniture of teak upholstered with light oxhide. The dining saloon, seating 72, is panelled in light ash, with furniture covered with red leather. The second class smoking room, accommodating 115, is panelled in teak, with chairs and sofas upholstered in blue leather. In the non-smoking saloon the upholstery is red. All ceilings in the public rooms are of perforated aluminium covered with rockwool on the upper side, to reduce noise.

Second class smoking room, which seats 115, showing large windows

MORE INDEPENDENT AIR SERVICES RECOMMENDED.—Stimulation by the Government of competition within the air transport industry by allowing more than one British operator on each route and by amending the Air Corporations Act, 1949, so that independent operators can run scheduled services in their own right has been recommended to Mr. Harold Watkinson, Minister of Transport & Civil Aviation, by the Association of British Chambers of Commerce. This is one of a series of proposals contained in the report of the Association working party set up a year ago "to study the question whether the whole future development of the United Kingdom's air transport is being adversely affected by the present licensing system."

ELECTRIC RAILWAY TRACTION SECTION

Four-system Electric T.E.E. Trains

A COMBINATION of the techniques used in the Brussels-Amsterdam dual-voltage d.c. multiple-unit trains and in the dual-frequency rectifier locomotives of the S.N.C.F. would provide the means of inter-running between four different electrification systems. The Trans-Europe Express programme has now made a necessity of what might once have been no more than an interesting technical possibility. For operating Milan-Paris and Milan-Zurich services, both of which routes are electrified throughout, but on different systems, the Swiss Federal Railways have ordered four five-coach T.E.E. sets equipped for running on two d.c. voltages and two a.c. voltages and frequencies. Contracts have been placed with the Swiss Industrial Company and with Oerlikon. These will be the first T.E.E. electric trains. The full range of facilities will be necessary on the Milan-Paris journey via the Simplon Tunnel, as the trains will run on 3,000 V. d.c. from Milan to the Swiss frontier; on 15 kV., 16⅔ c/s a.c. within Switzerland; on 25 kV. 50 c/s from Vallorbe to Dôle; and on 1,500 V. d.c. from Dôle to Paris. On the Milan-Zurich journey, via the St. Gotthard, only the Italian 3,000-V. d.c. and Swiss 15-kV. a.c. systems will be involved. To meet all these requirements, the trains will have d.c. traction motors supplied direct from the overhead line d.c. sections, and through transformers and silicon rectifiers on a.c. As noted in connection with the S.N.C.F. dual-frequency locomotives in our March 13 issue, the two a.c. voltages need not complicate the equipment to a great extent because the different frequencies concerned compensate for changes in input voltage.

It is proposed to make the operations of changing from one system of traction to another completely automatic, under the safeguard of interlocks, so that no more will be required of the drivers than normal proficiency and a knowledge of the road. The sets will be equipped with four pantographs having collector pans of the types appropriate to the different systems. Despite the relative complexity of the electrical equipment (as distinct from the ease of operation which has been studied in the design) it is probable that it will not be necessary to include a maintenance engineer in the crew, although this is the practice in the present diesel trains on the Zurich-Amsterdam T.E.E. service. The new sets will be formed of five vehicles. Coaches 1, 4, and 5 will each seat 42 passengers and provide toilet and luggage accommodation. Coach 2 will carry the traction equipment and will also have a kitchen and crew accommodation. Coach 3 will be a restaurant car. Experience with the present T.E.E. trains having shown that centre-corridor coaches are preferred, it has been decided that this layout will be adopted in all vehicles for the new trains. The restaurant car will be arranged with double seats on one side and single seats on the other side of the gangway. A small bar section with six passenger seats will complete the passenger accommodation in this vehicle. Auxiliary supplies for cooking, air-conditioning, heating, lighting and other services will be supplied by a three-phase alternator driven by motors operating on d.c. or rectified a.c. according to the traction supply.

The new T.E.E. electric trains will be designated " RAe " 1051-1054. Overall length will be 402 ft. 10 in. and the weight 244 *tonnes*. Four of the six axles of the motor coach will be power-driven, giving a total of 3,400 h.p. Maximum speed will be 99·4 m.p.h. It is intended to place the new trains in service in 1961 and so to link up the T.E.E. systems of Northern and Southern Europe via the Saint Gotthard and Simplon Tunnels. This development illustrates the value of the work which has been done on prototype units for dual-frequency and dual-voltage operation. It might have appeared at one time that such types of motive power would have only limited application, in frontier areas, but as different forms of electrification have extended and met, the importance of flexibility has grown. It is generally agreed today that electric motive power must run long mileages to be economic, and on certain routes inter-running between systems is inevitable if this principle is to be followed. It would certainly be preferable if the technical skill devoted to these problems inherited from the past could have been directed to some of the many other tasks facing traction engineers at this time, but history endowed Europe with a number of traction systems which for many years developed in watertight compartments. The co-operation implicit in the steps being taken to overcome these difficulties reflects an attitude to electrification in which exchange of experience between all systems has replaced partisanship for a particular one. At present the 50-cycle system represents only a small proportion, in France, from Vallorbe to Dôle, of the Milan-Paris journey, but the availability of multi-system motive power could remove one obstacle to its extension or adoption by any of the railways concerned.

Electric Locomotives for South Africa

NOW that delivery has begun of the 135 electric locomotives ordered by the South African Railways from Metropolitan-Vickers Electrical Export Co. Ltd., and with electrification programmes well in hand in several parts of the system, it is clear that the momentum of the S.A.R. expansion programme is increasing and shows that every effort is being made to ensure that the railway system is adequate for the expanding economy of the country.

The 2,200-h.p. 3,000-V. d.c. 84-ton locomotives are being built at the Stockton Works of Metropolitan-Vickers—Beyer Peacock Limited. With their Bo-Bo wheel arrangement they are classified as Type " 5E1," and have a continuous tractive effort at the wheels of 26,000 lb. at 26·6 m.p.h. and a 1-hr. tractive effort of 32,000 lb. at 25 m.p.h.

The gauge of 3 ft. 6 in. imposes certain limitations, particularly on motor design, but with the use of silicon insulation, the traction motors can be run at higher temperatures with increased ratings. Silicones are being increasingly used for traction motor insulation where high temperatures are encountered as in the London Transport tubes, where space is restricted.

Most failures in traction motors arise from the thermal ageing of the insulation which leads to carbonisation and tracking. Silicone materials possess a much more stable chemical structure than organic insulating materials, and their decomposition, when it takes place, leaves no electrically conducting products. They can better withstand high temperatures and are less liable to thermal ageing. Their use offers substantial advantages in the general efficiency of traction motors. The ability of silicone insulation to withstand high temperatures permits a reduction in the size of a machine for a given output by enabling it to be run closer to the limit of its rating.

The present ratings of the locomotives, at 1,450 V. per motor and assuming an ambient temperature of 25° C., are 550 s.h.p. at 648 r.p.m. on the 1-hr. full field rating, and 471 s.h.p. at 688, r.p.m. on the continuous full field rating. Weak field notches are also provided giving the same s.h.p. outputs at the increased speeds of 810 and 904 r.p.m. respectively.

Multiple-unit control is incorporated, enabling locomotives to be used in tandem where necessary, and to be driven from one cab. The control voltage of 110 V. d.c. is supplied from two identical motor-generator sets running in line voltage. These also supply excitation for the traction motors during regeneration and provide for battery charging and the driving of ventilating fans for the cooling of main resistances and traction motors. To minimise the ingress of dust into the main body of the locomotive, the air is pressurised; the two driving cabs are kept at normal pressure.

Multiple-Unit Stock for Kent Coast Electrification

Southern Region four-car express units and two-car intermediate units

Four-car corridor unit for Kent Coast electric service

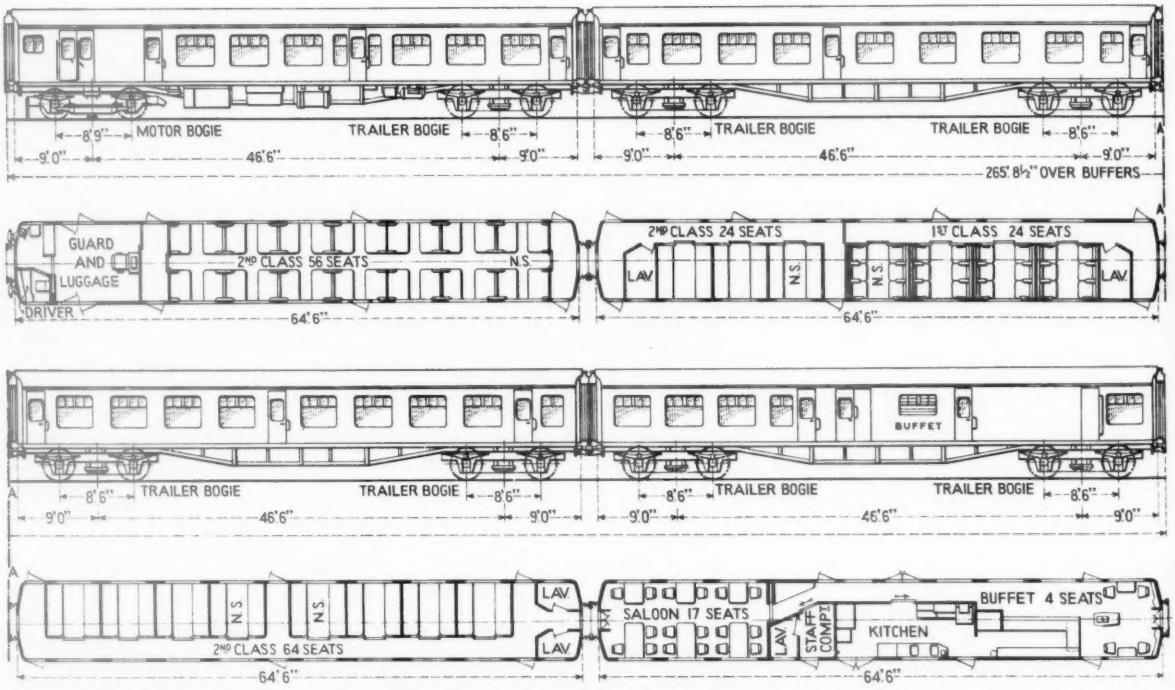
MOST of the 53 four-car express electric units required for phase 1 of British Railways Southern Region, Kent Coast third-rail, 750-V. d.c. electrification scheme have been completed at Eastleigh Works, Southern Region.

They are almost identical with the units completed in 1956, and all the features contributing to simple and flexible operation which have been well tried and found valuable on all the Southern Region stock built since 1951 are incorporated. These are as follow: All classes of stock couple and inter-run in multiple unit trains. Preparation of the train for service is reduced to closing one switch on each motor coach and releasing handbrakes. The driver needs only one small key to drive the train. The same applies to all Southern Region diesel and electric trains and locomotives, and the key is a personal issue to each driver. Inter-unit couplings are reduced to the minimum and grouped to make coupling and uncoupling quick and safe at platform level. Buck-eye automatic couplers are fitted with the same purpose and the trains run with them in the raised position, and with the side buffers retracted, ready for coupling to another unit.

Traction Motors

The motors are also of the same power as those of the earlier units and give the same level balancing speed of 72 m.p.h. but the acceleration rate has been raised slightly, partly to ensure satisfactory performance on the 1 in 30 gradient of the Folkestone Harbour Branch which will be electrified in the second phase of the present scheme. Layout and general construction of the coaches, too, is much as in the earlier units but both electrically and mechanically there are several important changes.

An oil/air operated camshaft switch group replaces the electro-pneumatic unit switches of the control equipment of the older units, and both axle journal and motor suspension bearings are now of roller type. To minimise the risk of current passing through any of these bearings, the return side of both traction



Principal dimensions and layout of four-car express unit and buffet car. The buffet replaces the second class compartment trailer. The other motor coach is identical to that illustrated

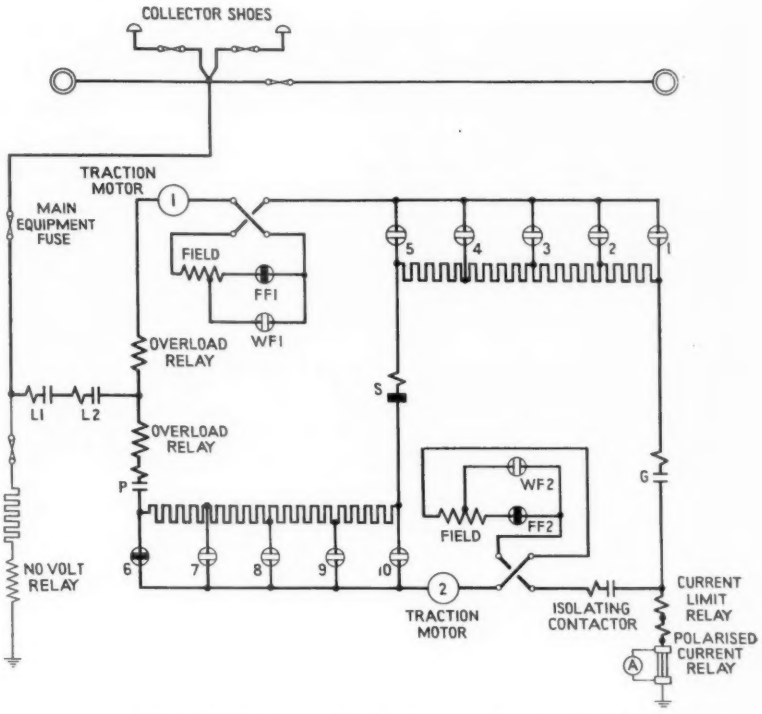
and auxiliary circuits is brought to insulated earth brushes bearing directly on the axles.

Camshaft Controller

The construction of camshaft controller consists of a frame component upon which is mounted the electro-pneumatic vane actuator, the camshaft, control switch group, power contactor group, and the spark guard.

The actuator consists of a casting containing a vane chamber, two oil reservoirs, an equalising reservoir and two compressed air operated oil valves. These movement control valves control the oil flow from the reservoirs to the vane chamber. The oil is forced up to the valves by compressed air admitted to one reservoir or the other by magnet valves.

Each reservoir is connected to the common equalising reservoir by valves which allow the oil level in the three reservoirs to equalise whenever neither of the supply reservoirs is under air pressure. A level indicating window is situated at the front of the equalising reservoir so that a visual oil level check can be made. In the event of an undue rise in the level of its oil content each reservoir is fitted with a float valve which seals off the air inlet so preventing oil being forced into the magnet valve.



Schematic diagram, showing layout of power circuit

Self Lubricating Bearings

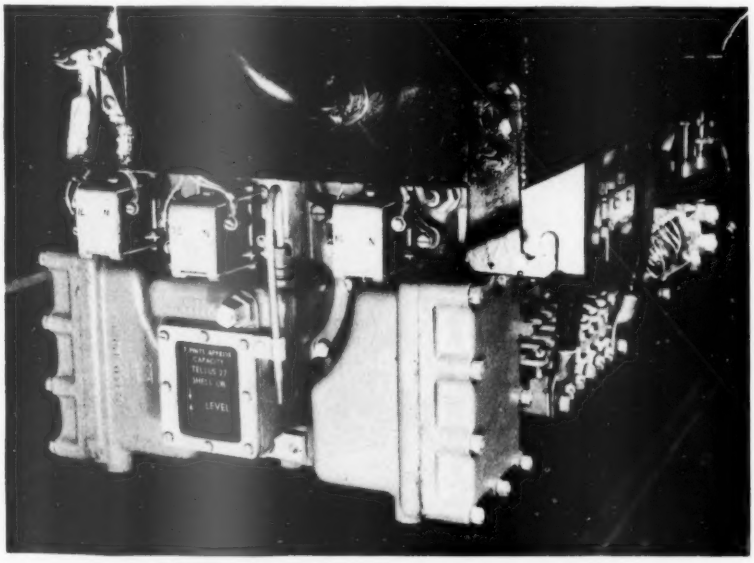
The camshaft is carried in self lubricating bearings at each end and the drive clevis keyed to it engages with the actuator drive lever. There are two sets of cams, one for the control circuits and one for the power circuits. These are individually spaced on the shaft by spacing collars and are accurately positioned relative to one another.

The camshaft drive clevis is fitted with set screws to allow for adjustment of the camshaft position relative to that of the actuator vane assembly.

The vane actuator is electro-pneumatically controlled by the operation of three magnet valves mounted on top of the casting. When the magnet valves are closed and there is no air pressure in the reservoir chambers the equalising valves will be open allowing the levels in the three chambers to equalise. When air pressure is applied to a reservoir chamber, the associated equalising valve closes and this seals the reservoir off from the equalising reservoir.

For a clockwise movement of the actuator, the magnet valve controlling the compressed air inlet to the right hand reservoir is energised and air enters the chamber and forces the oil up to the right hand movement control oil valve. When operated these valves allow oil to flow into the right hand side of the vane chamber and out of the left hand one. When the camshaft reaches the pre-selected position the oil valves are closed by de-energising the controlling magnet valve and the camshaft is locked immobile until the oil valves are again opened. Drains from the shaft and valve stems allow leakage oil to run back to the equalising reservoir.

To move the actuator in the opposite direction, the right hand magnet valve is de-energised and the left hand magnet valve is energised. Opening the movement control valves will then allow the oil under pressure to enter the left hand chamber and turn the shaft anti-clockwise.

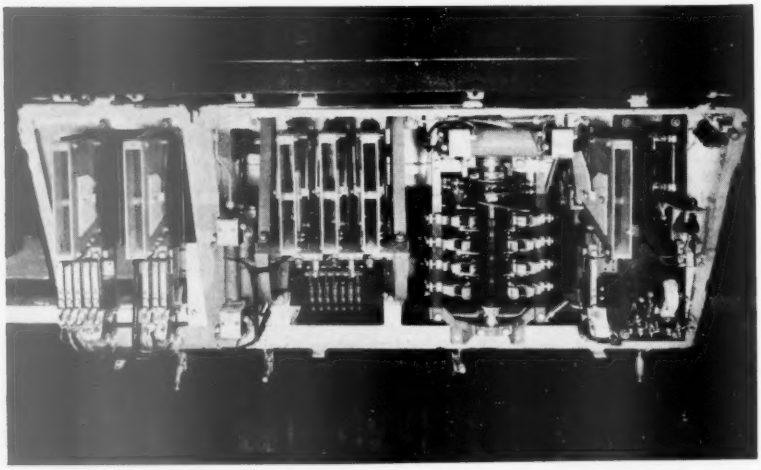


End view of camshaft unit, showing vane motors

Control and Power Cams

The camshaft has control and power cams mounted on it and the cams engage with the followers of their respective contactor elements. A current limit relay, which controls progression and also ensures that the camshaft completes every movement correctly, is operated by a control cam and its operating coils.

The two movement control valves are fitted in the valve body and are operated by a common diaphragm.



Equipment cabinet on underframe, showing line switches, series parallel switch, overload relay, and no-volt and lock-out relay

When air under pressure is admitted to the movement control valves diaphragm, by the movement control magnet valve, the diaphragm forces the valve stems off their seats against the spring pressure holding them closed. Oil can then flow to or from the vane chamber in a direction depending upon which reservoir is under air pressure.

The valve springs keep the equalising valves open when there is no oil pressure in their respective chambers. As soon as air pressure is admitted to a reservoir by a magnet valve, oil tries to flow through the equalising valve to the equalising reservoir. Flow under pressure overcomes the spring holding the valve open and the valve closes and seals off the port to the equalising reservoir.

The overall cost of the traction equipment has been substantially reduced as compared with the earlier units and one of the principal contributions to this has been made by providing only one motor generator set and battery per unit instead of one per motor coach. This has been possible because of the reliability of these installations in service. It will still be possible to interchange motor coaches if necessary, as a result of accidental damage, at the expense of fairly simple modifications.

The braking system is also to a new design. The components are smaller and lighter than before and a good many of the metal-to-metal contacts which are the principal sources of wear and maintenance, have been eliminated.

Bogie Design

A number of other changes have been made to reduce wear and improve comfort. The bogies are identical with those of the Hastings diesel-electric units. They have been fitted with lateral shock absorbers, shear-type rubber auxiliary springs and rubber bonded spherical bearings for the bolster swing hangers. The gangway stems are now rubber mounted and the gangway face plates lined with anti-friction material to eliminate periodical lubrication which previously necessitated the separating of the coaches of units every month. These changes are also being made to the older express units.

Windows are double glazed, and heat and sound insulation has been installed for the body sides, ends, roofs and floors. The capacity of the heaters has also been increased. The unit consists of two motor second brakes, one corridor composite and one corridor second.

Passenger Accommodation

The layout of the passenger accommodation of the motor second brake consists of two saloons separated by a centre transverse glass panelled screen. There are vestibules at either end with access from both sides of the car, and centre bodyside doors in one of the saloons on both sides of the car. The car seats 56 passengers and has a centre gangway running the length of the saloons.

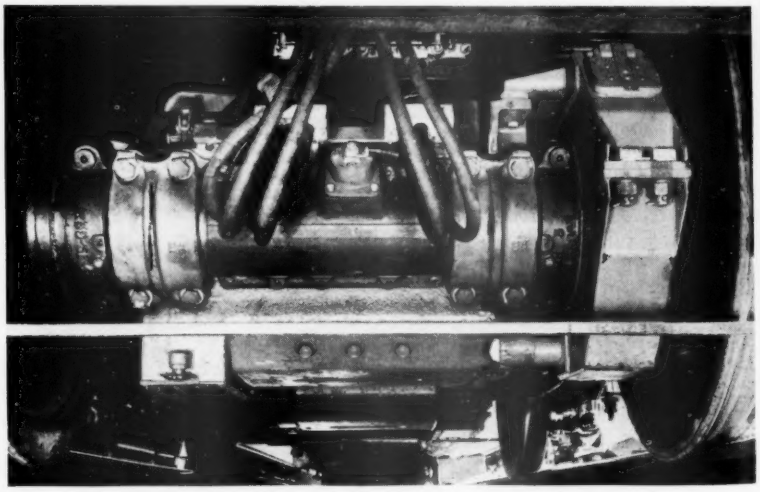
The bodysides are finished in plastic panelling with windows framed with sycamore or ash. The bodyside panels below and between the windows are of plastic steel-blue matt finish with a narrow glossy black panel immediately below the window sill to take ash trays and table mountings. The panels above the windows and the ceilings are of light grey matt finish. The saloon ends and centre partition are finished in glossy white plastic.

The corridor second consists of eight second class compartments seating 64 passengers, with side corridor and twin lavatories at one end of the coach and with end and centre vestibules. The compartment bodysides are finished in sycamore or ash. The bodyside panels below the windows and either side of the windows are of red plastic matt finish, with a narrow glossy black panel immediately below the window sill. The ceiling is panelled in light grey matt finish plastic.

Corridor Composite Coach

The corridor composite vehicle consists of four first class compartments seating 24 passengers and three second class compartments seating 24 passengers with side corridor. There are lavatories and vestibules at either end and a centre vestibule with corridor dividing doors between the first and second class accommodation.

The bodysides are finished in plastic panelling, with windows framed in sycamore. The bodyside panel below the window and either side of the window is in green plastic matt finish, with a narrow glossy black panel immediately below the window sill. The ceiling is panelled in light grey matt finish plastic and the partition above the seat back in walnut veneered panelling. The corridor partition is panelled in dove grey plastic, with a glossy white plastic panel above the



Traction motor suspension unit, showing earth bushes

door-head. The corridor and vestibule at the first class end of the car are finished in plastic throughout, the bodyside and ceilings being panelled in light grey matt and the corridor partition in dove grey.

Buffet Cars

Ten of the 53 units will have buffet cars in place of the second class compartment trailer cars. The buffet cars in these units will be of steel construction to the British Railways steam stock 9 ft. profile and their general layout and equipment is much as in those of the earlier units and the Hastings diesel-electric units.

The layout of the vehicle is in three main parts, the dining saloon at one end, kitchen and staff quarters in the middle, and the bar and buffet at the other end of the car. A corridor with a service counter from the kitchen connects the saloon and buffet ends.

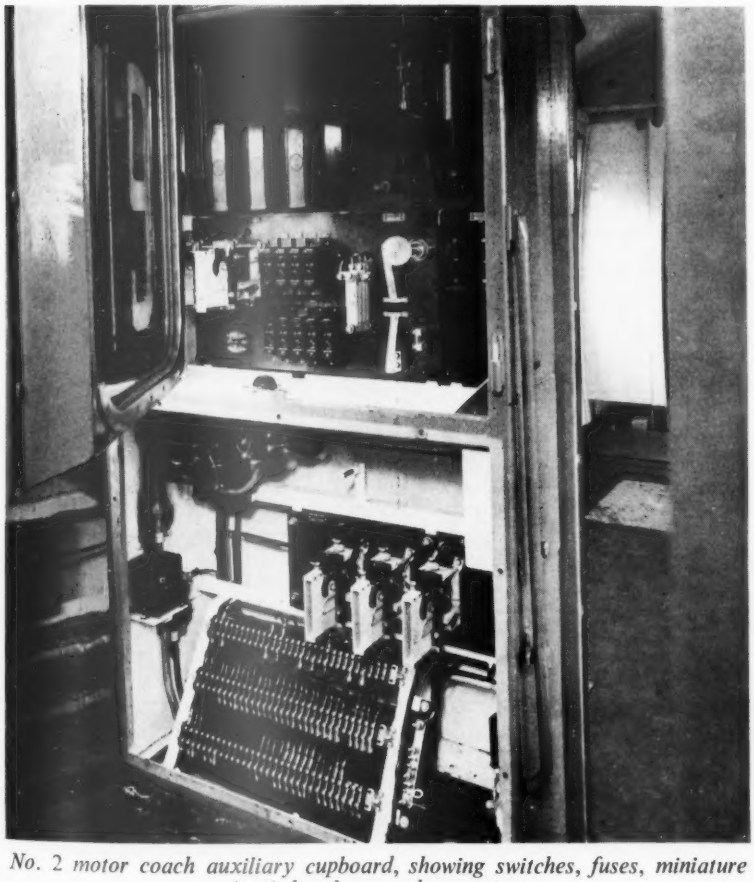
Dining Saloon

The dining saloon seats 17 passengers, and is finished in plastic panelling framed with sycamore. The bodyside panels from the floor to ceiling are of plastic greywood, and the ceiling panels of matt white finish. The saloon end and draught screens at the gangway doorway entrance are finished in stardust brown. The saloon transverse partition at the kitchen end is finished in glossy white plastic, and the table tops are covered with blue-grey check plastic.

The kitchen, which has steel framed walls, with aluminium panels and cavities insulated with fibreglass, is equipped with an electric cooker, with grill and hot closet, a refrigerator, and ice-cream conservator. The sink unit is of stainless steel, with an electrically heated sterilising unit. Communication is provided between the kitchen and buffet to facilitate service, and the coffee machine has been housed between the two for convenience. There is a bottle cooler under the end of the counter in the buffet, remote from the kitchen, and extractor fans are fitted in the roof over the kitchen and also over the coffee machine. The interior décor of the buffet end is generally similar to that of the dining saloon.

The lighting in the buffet and saloon is by roof lamps with reflectors. Heating is provided by bodyside convectors.

Two bodyside doors are fitted in the buffet, which can be used as exits by the passengers in the case of any emergency. Double swing self-closing doors and draught screens are fitted at each end of the car.



No. 2 motor coach auxiliary cupboard, showing switches, fuses, miniature circuit breakers, and contactors

A 120-gal. water tank is carried on each underframe for catering purposes, with an electrically operated compressor suspended in a resiliently mounted case adjacent to it, for raising the water to the service taps through pipes at a low pressure varying from 5-12 lb. per sq. in. No roof water tanks are needed, which will contribute to the reduction of maintenance. The condensing units for the refrigerator, ice-cream conservator and bottle cooler, are also carried on the underframes.

The motor generator set, with an electrical equipment case supplying and controlling the cooking load, are also mounted on the underframe, the latter containing the various contactors and relays for the electrical appliances, which are fed from this case by cables carried in conduits along the underframe and up through the floor of the coach.

Two-Car Units

For the intermediate services 62 two-car units will be used for phase I. They will consist of a semi-saloon second class brake motor coach and a composite driving trailer with lavatories for both classes. There will be no corridor connection between coaches. Construction will be similar to the express units but without double-glazed windows. The motor luggage vans will be similar both mechanically and electrically to the multiple-unit coaches with the addition of a traction battery to allow them to work for a limited period over quayside lines which cannot be electrified.

The stock was built at Eastleigh Works, British Railways, Southern Region, under the general direction of Mr. W. J. A. Sykes, Chief Mechanical & Electrical Engineer; Mr. H. S. Smyth, Electrical Engineer; and Mr. F. J. Pepper, Carriage & Wagon Engineer.

The principal sub-contractors are as follow:—

Electric traction equipment	English Electric Co. Ltd.
Electro-pneumatic brakes	Westinghouse Brake & Signal Co. Ltd.
Axleboxes (roller bearing)	The Hoffmann Manufacturing Co. Ltd.
Wheels and axles	Taylor Bros. & Co. Ltd. Owen & Dyson Limited J. Baker & Bessemer Limited
Bolster springs	English Steel Spring Corporation Limited Turton Bros. & Matthews Limited
Vestibule suspension	George Spencer Moulton & Co. Ltd. Andre Rubber Co. Ltd.
Drophead couplers	Laycock Engineering Limited A. G. Wild & Co. Ltd.
Solid shank couplers	English Steel Castings Corporation Limited
Buffing and drawgear (springs)	George Spencer Moulton & Co. Ltd.
Shock absorbers	Woodhouse Monroe Limited
Auxiliary bearing springs	B.T.R. Industries Limited
Anti-friction materials	J. W. Roberts British Belting & Asbestos Limited
Route indicators	Transport Engineering & Equipment Limited
Window wipers	Trico-Folberth Limited
Windows	Beckett, Laycock & Watkinson Limited
Interior panels	Formica Limited Warerite Limited
Bodyside passenger doors	Lightalloys Limited
Self closing gear for double doors	G. D. Peters Limited
Ventilation fans	Vent Axia Limited

XUM

The "16000" and "16500" Class Locomotives of the S.N.C.F.

High-speed and mixed traffic designs for 50-cycle main-line electrification

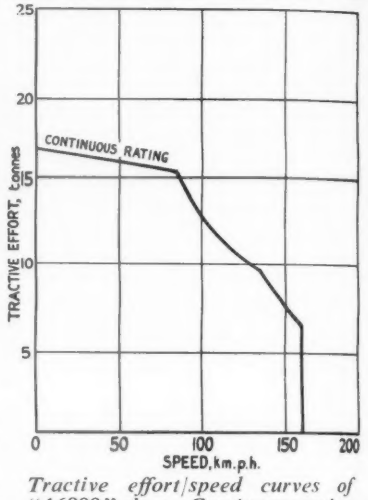
One of the "16000" class Bo-Bo locomotives built by Matériel de Traction Electrique, the body design uniform with that of the "9200" d.c. series

WHEN the decision was taken to electrify the French National Railways main lines from Paris to Lille and to Strasbourg the need for a high-speed passenger locomotive to operate on the 50-cycle system arose for the first time in France. Motive power for the Lille-Basle electrification had been planned primarily for heavy freight working, and while two of the classes which have been successful in that scheme will also find employment on the new electrifications of the Northern and Eastern Regions of the French National Railways, it has been necessary to introduce two more. One of these, Class "16000," has a top speed of 99½ m.p.h., while the other, Class "16500," meets the widest possible range of mixed traffic requirements by means of a variable gear ratio, giving it a top speed of 56 m.p.h. in goods service and of 93 m.p.h. on passenger duties.

The heaviest coal trains on the newly electrified Paris-Lille line are being worked by the 20 single-phase/three-phase Co-Co locomotives of Class "14000" transferred from the Lille-Basle section. Much mixed traffic work is undertaken by 43 Bo-Bo rectifier locomotives of the "12000" class similar to the original Valenciennes-Thionville design, but many duties in this category do not require an 83-*tonne* locomotive and the "16500" class has been introduced to provide a light and consequently cheaper unit for working such trains more economically.

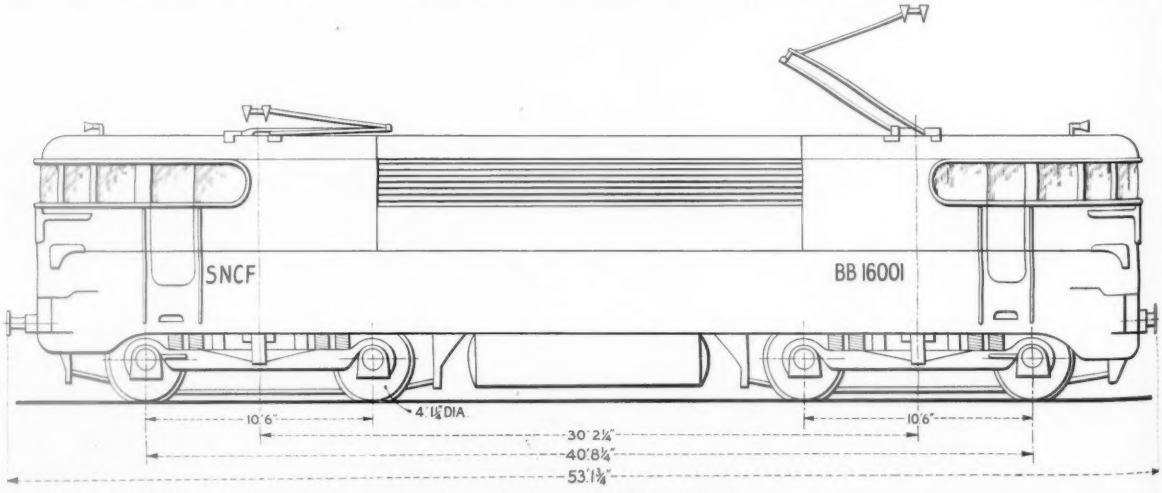
"16000" Class

The "16000" class locomotive is a Bo-Bo built by the Matériel de Traction Electrique group in which the electrical system is derived from that of the "12000" class rectifier locomotives and the mechanical parts are similar to those of the "9200" class for the 1,500-V. d.c. lines. Principal particulars are as follow:—



Tractive effort/speed curves of "16000" class. Continuous rating 1040A, one-hour 1120A

Weight in working order	84 *tonnes*
Overall length	53 ft. 2 in.
Total wheelbase	40 ft. 8 in.
Bogie wheelbase	10 ft. 6 in.
Wheel diameter	4 ft. 1¼ in.
Maximum speed	99·4 m.p.h.
Continuous rating	4,900 h.p.
One-hour rating	5,280 h.p.



Principal dimensions of "16000" class locomotive

With this locomotive a 700-*tonne* passenger train (approximately 16 coaches) can be hauled up a gradient of 1 in 100 at 99·4 m.p.h. Two Faiveley Type AM pantographs are fitted, but many other electrical components such as the main circuit-breaker, relays and fuses are common with those of the "12000" class by the same group of builders. The main transformer, built by Schneider-Westinghouse, has a shell type core of Hypersil grain-oriented silicon sheet and consists of a single tank containing the traction, auxiliary and train heating windings. The tap-changer is operated by a Jeumont servo-motor as in the "9200" class d.c. locomotives. Eight Schneider-Westinghouse rectifiers are connected in push-pull pairs to supply d.c. to the four traction motors. The water-cooled rectifier cylinders have a dia. of 10 in., as compared with 8 in. in the "12000" class, and will give an output of 1,000A. at 1,000 V. Cooling water is circulated by a pump driven by a three-phase motor and its temperature is regulated thermostatistically.

The Jeumont traction motors are similar to those of the "12000" class locomotives but are fitted with compensating windings to permit the extended degree of field weakening required by the stipulated performance. In this way a tractive effort of 7 *tonnes* is developed at the top speed of 99·4 m.p.h., giving a characteristic similar to that of the high-speed d.c. locomotives of Class "9200." Class F insulation has been used for the armature and Class H for the field windings of the traction motors.

A swing link suspension system between bogies and body dispenses with conventional pivots, the body weight being carried by side bearers which serve to damp bogie oscillations. In the absence of a pivot, the two motors in each bogie are mounted at the centre, which further restricts the tendency to hunting.

The Jacquemin type cardan transmission, which is concentric with the axles, follows the lines first seen in the high-speed Bo-Bo prototypes Nos. 9003 and 9004. Tractive forces are transmitted from the bogies to the body by longitudinal rods in approximately the plane of the axles so that weight transfer is minimised. All other linkages in the bogie-body system have Silentbloc bushes to eliminate the play and wear which otherwise might occur.

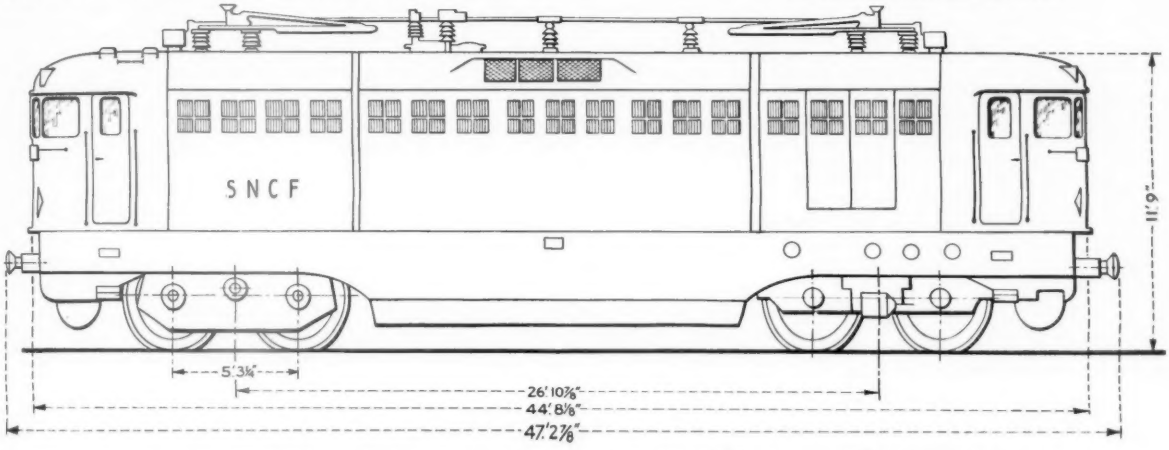
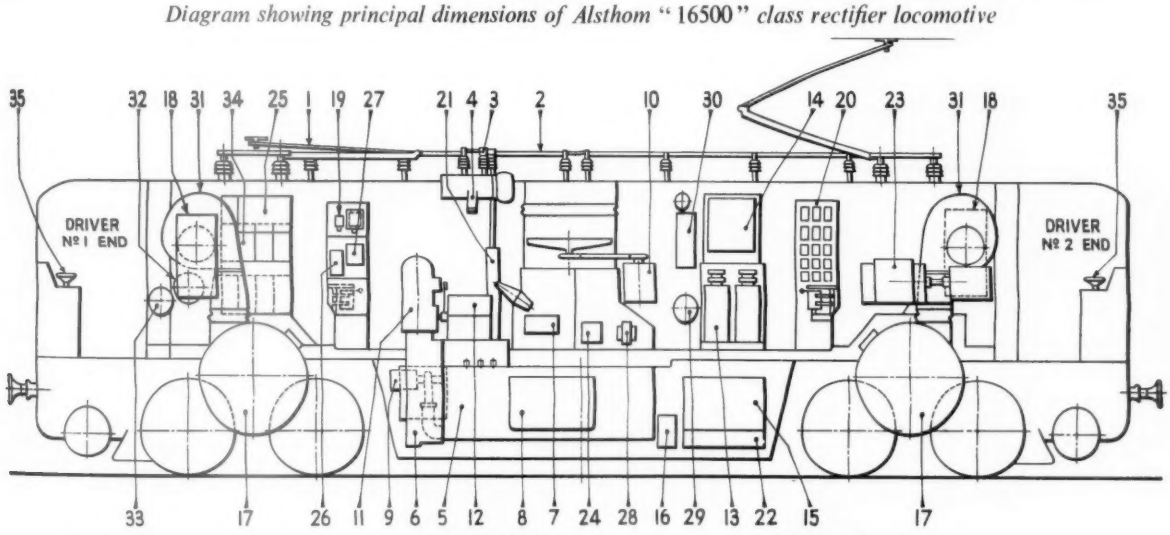
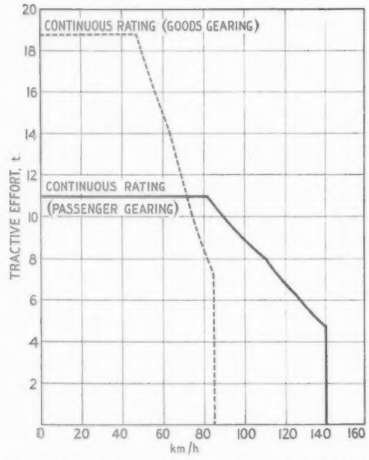


Diagram showing principal dimensions of Alsthom "16500" class rectifier locomotive



1 pantograph
2 busbar
3 circuit breaker
4 earthing switch
5 main transformer
6 tap-changer
7 tap-changer transition resistance
8 oil cooler
9 oil circulating pump and motor
10 blower for oil cooler
11 tap-changer motor
12 servo-control relay panel
13 rectifier cubicles
14 excitation panel
15 auxiliary transformer
16 transformer protection
17 traction motor
18 motor blower
19 No. 1 equipment frame
20 No. 2 equipment frame
21 condenser bushing
22 smoothing choke
23 motor-compressor set
24 dry plate rectifiers
25 battery charger
26 heating contactor
27 interlock key cupboard
28 auxiliary machine smoothing chokes
29 water circulating pump and motor
30 water system
31 water cooler
32 reserve water tank
33 auxiliary compressor
34 battery
35 controller

Layout of equipment in "16500" class locomotive



Tractive effort/speed curves of "16500" class locomotive

Auxiliary machines are driven by three-phase squirrel-cage motors supplied through an Arno phase-converter of Oerlikon construction, which also drives the battery-charging generator.

Twenty-four of these locomotives were ordered for the Paris-Lille electrification, half of which had been delivered by the opening date in January. Orders for 10 more have been placed already in connection with the Paris-Strasbourg scheme, and a further 17 will be called for later.

Locomotives of Class "16500"

The distinctive characteristics of the "16500" class locomotives are the single-motor bogies and the variable gear ratio system which enables either the passenger or the goods gearing to be engaged by the manipulation of levers inside the cab. By using this facility (only available when the locomotive is stationary) the performance can be modified so that the locomotive will start on a gradient of 1 in 100 and a curve of 25-ch. rad. with a goods train weighing 1,600 *tonnes*, or run on the level at 87 m.p.h. with a passenger train of 800 tons. At 68 *tonnes* the "16500" class is the lightest and cheapest to build of any electric design yet produced for the S.N.C.F.

Deliveries of these locomotives are taking place from the Alsthom works at Belfort at the rate of five a month.

Construction of Frame

The main frame of welded steel sheet supports a superstructure in which extensive use has been made of plastics for detachable panels. The body is supported on the bogies in the first place by swing pivots with lateral spring centring arrangements of the type used in the Alsthom high-speed Co-Co locomotives for the d.c. lines, and in the second place by four friction side bearers on each bogie. Welded construction is used also for the bogie frame, which is shaped to form a central cradle to receive the traction motor. The frame rests on coil springs supported from the axleboxes, which are inside the wheels. As is now usual in Alsthom bogies, there are no axlebox guides, but the boxes are connected with the frame by top and bottom horizontal links with Silentbloc bushes. A result of having only one motor in the bogie is an unusually short wheelbase, measuring only 5 ft. 3½ in. To obviate any adverse effects on performance, tests were carried out at high speeds with a full-size model before construction was begun.

Motors and Gearing

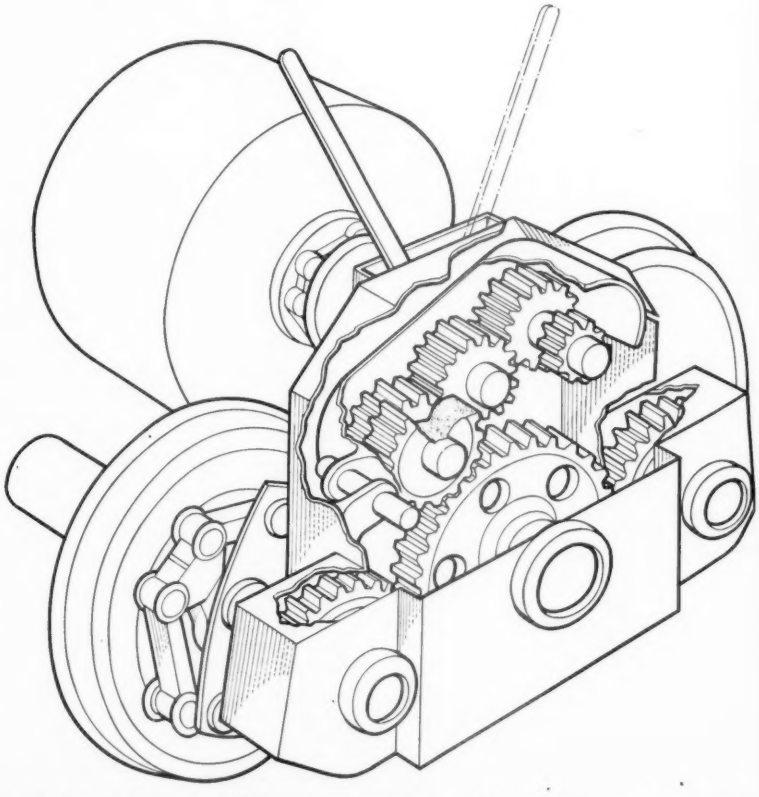
The traction motors have class H silicone insulation throughout and are rated at 3,500 h.p. (continuous) or 3,600 h.p. (1-hr.). Each machine is coupled through an Alsthom floating ring flexible drive to a pinion in a separate gearcase. The pinion drives two shafts, one on each side, each shaft carrying an output gear of a different size.

The whole of this gear assembly can be rotated through a few degrees so that either one or the other output gear engages with a large gearwheel in fixed bearings. Through this gear are driven the two final gearwheels, which are connected to the axles by further floating ring drives. As can be seen in the diagram of the gearing, the axles are coupled through this large central gear, and the wheel notation for the locomotive is therefore B-B. A change of gear ratio can be effected in 3 min. by movement of the two internal levers, one for each bogie. The movable gear train can also be locked in a neutral position out of engagement with the final transmission to the wheels, so that the locomotive can readily be prepared for towing if necessary.

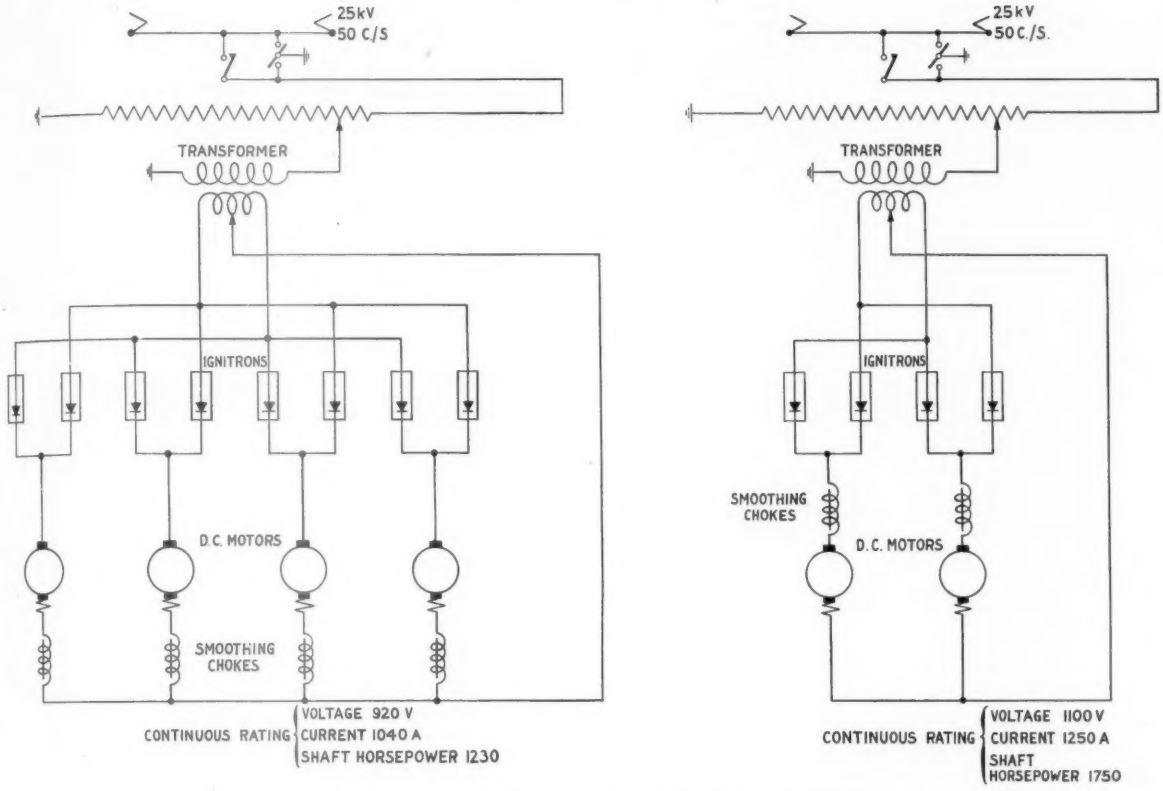
Characteristics of the locomotive with the two gear ratios are tabulated below:—

	Passenger ratio	Goods ratio
Gear ratios	1·88/1	3·206/1
Output at motor shaft:		
Continuous	3,500 h.p.	3,500 h.p.
One-hour	3,600 h.p.	3,600 h.p.
Maximum speed	93 m.p.h.	56 m.p.h.
Speed at continuous rating ..	51 m.p.h.	30 m.p.h.
Tractive effort at continuous rating	11¾ tons	19¼ tons

The rectifier equipment consists of four ignitron units connected as two pairs for full-wave rectification of the input to each motor. At the continuous rating each pair gives an output of 1,250 amp. at 1,100 volts. Auxiliary machines are mostly driven by d.c. motors fed through selenium rectifiers, constituting the first extensive use in S.N.C.F. locomotives of this form of rectification. Provision is made for operating two or more locomotives of this type in multiple, and for remote control of a locomotive from a motorman's compartment in a train of suburban rolling stock. This method of



Reduction gear of "16500" class locomotive with passenger ratio engaged

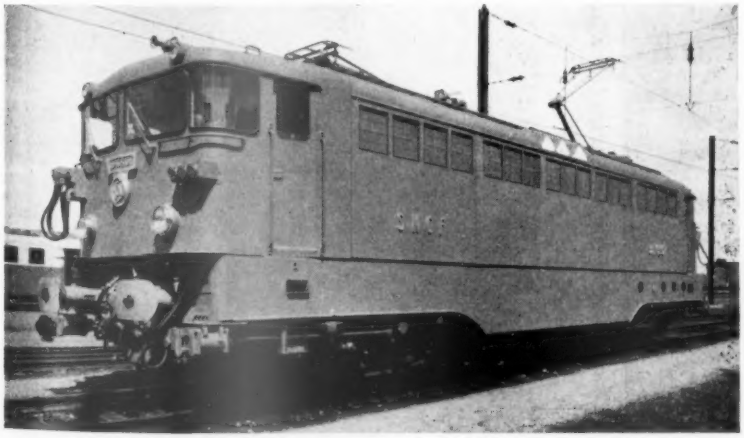


Power circuits of "16000" *(left) and* "16500" *class locomotives*

push-pull working by electric locomotives has been used previously on French National Railways in the South Eastern Region, where some units of one of the older Bo-Bo classes were adapted for the purpose before the multiple-unit sets for suburban services from Paris Lyon became available.

The oil-cooled transformer consists of a single tank housing a tapped auto-transformer winding and a fixed-ratio traction transformer across the secondary of which the traction motors are connected. The high-tension tap-changer is operated by a Jeumont servo-motor of the same type as is used in the "16000" class locomotives. Similarly, the Faiveley pantographs and the main circuit-breaker are common with the "16000" class. It is stated that, in goods working, adhesion factors of 50 per cent have been recorded on dry rail and of 35 per cent on very greasy rail. Riding qualities at 87 m.p.h. have shown a stability which suggests that the maximum speed limit could be raised above this figure.

In general the electrical scheme of the "16500" class locomotives is conventional for rectifier designs, incorporating features such as a small degree of permanent field-shunting (12 per cent) to assist commutation and three weak-field runnings steps, the last of which leaves 48 per cent of the field effective and so has not called for the use of a compensating winding. The permanent-parallel connection of the traction motors also follows established practice and is in contrast with the only other single-motor class at present in service on the S.N.C.F., consisting of the two Swiss-built dual-frequency rectifier locomotives, in which the motors are in series across a bridge-connected rectifier system, but are provided with an equalising connection to give adhesion characteristics similar to those claimed for the parallel arrangement (see our March 13 issue).



Alsthom rectifier locomotive of "16500" *class*

DIESEL RAILBUS SERVICE ON AYR-DALMELLINGTON BRANCH.—A diesel railbus is now working on the Ayr-Dalmellington branch of British Railways, Scottish Region. The new service consists, on Mondays to Fridays, of four railbuses from Dalmellington to Ayr and five from Ayr to Dalmellington, and on Saturdays of seven services from Dalmellington to Ayr, including two steam trains, and eight from Ayr to Dalmellington, including three steam trains. The railbus is one of the 150-h.p. series, weighing 15 tons, built by Park Royal Vehicles Limited, and described in our issue of August 15, 1958.

Nigerian Railway Extension

Track laying at Haipan Station (see editorial reference on page 410)

Inspection by Sir Ralf Emerson, Chairman, Nigerian Railway Corporation

Preparing for last concrete pour, culvert 30

Concreting at Lafon Bridge, east abutment

RAILWAY NEWS SECTION

PERSONAL

Mr. D. G. Shipp, M.I.E.E., M.I.R.S.E., Assistant Manager, Signal & Colliery Sales & Engineering Division, Westinghouse Brake & Signal Co. Ltd., who yesterday was elected President of the Institution of Railway Signal Engineers, was born in 1907 and educated at St. Dunstan's College. After a four-year course at Northampton Engineering College, including practical experience with the British Thomson-Houston Co. Ltd., he graduated at London University, in 1928. In the same year he joined the Engineering Department of Westinghouse Brake & Saxby Signal Co. Ltd. and was engaged on the development and design of many of the company's signalling products. As a member of the Territorial Army, he went to France with the British Expeditionary Force and, on his return in 1940, was commissioned in the R.A.O.C. and later transferred to R.E.M.E., on the formation of that corps. With promotion to the rank of Major, he became Principal Instructor on Radar Equipments, Wireless Branch, Royal Military College of Science, until 1943, when he was seconded to the Admiralty Signal Establishment for special duties in connection with radar development. Demobilised in 1946, he resumed his previous position with the Westinghouse Brake & Signal Co. Ltd., and, in the same year, was appointed Electrical Engineer in charge of the Engineering Department. Following re-organisation of the company, in 1951, he became Assistant Manager, Signal & Colliery Sales & Engineering Division, the position he now holds. Mr. Shipp was elected an Associate Member of the Institution of Railway Signal Engineers in 1931, a Member in 1948, and Member of Council in 1959. During this time he has served on six of the Institution's executive committees.

Mr. D. G. Shipp

Elected President of the Institution of Railway Signal Engineers, 1959-60

Mr. F. Q. den Hollander

President of the Netherlands Railways, 1947-59

Mr. F. Q. den Hollander, President of the Netherlands Railways, who, as recorded in our April 3 issue, has retired, was born at Goes (Zeeland), Netherlands, in 1893. He matriculated from Goes Grammar School, and, in 1916, was an Honours Graduate (Mechanical Engineering) of Delft Technical University. During 1916-17, he was trained by the Holland Railway Company for service in the Netherlands Indies State Railways which he joined in 1918. He became Chief Engineer in 1933; Operating Superintendent, South Sumatra, in 1936, and Operating Superintendent, Western Lines, Java, in 1937. Early in 1938, he returned to Europe as Assistant Manager, Government Workshops. In 1940 he became General Manager of the Netherlands Railways, and, from May to October, 1945, Permanent Under Secretary to the Minister of Economic Affairs. He then became General Managing Director of Transport with the Ministry of Transport, and, in 1946, returned to the railways as General Manager and acting President, becoming President in January, 1947. He was appointed President of the Office for Research & Experiments of the International Union of Railways (O.R.E.) in 1950. In 1954 he became a member of the Technical Development & Research Committee of the British Transport Commission. Between 1949 and 1954, Mr. den Hollander received the Ridder Orde Nederlandse Leeuw, Croix d'Officier Légion d'Honneur République Francaise, Kruis van Verdienste van het Nederlandsche Roode Kruis, and was made a Commandeur de l'Ordre Royal de Dannebrog. In 1955 he received the Conrad Gold Medal of the Institution of Engineers of the Netherlands for his work in connection with the reorganisation of the Dutch railways. Later that year, on the occasion of the Golden Jubilee of the Technical High School, Delft, he was made an Honorary Doctor of Technology. He is an Honorary Life Fellow of the Permanent Way Institution, a Fellow of the Royal Society of Arts, an Honorary Member of the Institute of Transport, and Honorary Member of the Institution of Railway Signal Engineers.

J. E. writes:

The retirement of Francis den Hollander from the Presidency of the Netherlands Railways is an event of international importance to the railway and, therefore, to the commercial world, particularly to the countries of Western Europe.

Mr. F. H. Jarvis

Appointed Assistant (Electrical Engineering), North Eastern Region

Mr. H. W. T. Young

Appointed District Traffic Superintendent, Chester, L.M. Region

Mr. R. W. Jackson

Appointed District Goods Manager, Glasgow, Scottish Region

During the German occupation of Holland, he, like so many of his compatriots in all walks of life, defied the Germans and moved underground, living often, as he once told me, from hand to mouth and never sleeping in the same bed more than once a fortnight. He survived, to find himself at the head of the Netherlands Railways system, literally smashed to pieces as a result of the war. He seized the opportunity which presented itself to give Holland a modern railway system utterly different from the old, in which the elimination of steam-working by electrification and dieselisation, the installation of colour-light signalling, and the ruthless pruning of all that was outmoded in the requirements of a modern community, were the basis of his plan. Equally important, he was determined that the railway men and women in the service should be brought fully into the enterprise and trained not only to work the railways, but to understand their value to the State in the tasks they were doing.

How brilliantly he and the team that he gathered round him, and his staffs everywhere, succeeded in the enterprise is by now a well-told story. A lesser man would have remained absorbed in the enormous burden of reviving the railways of his own country. For den Hollander this was only sufficient to absorb a part of his energies.

What is not so well known is the important part which den Hollander took in the resurgence of the European railway systems in the International Union of Railways (U.I.C.). There, under the Presidency of that other brilliant railway leader, Louis Armand, of the S.N.C.F., were laid the plans for the European Wagon Pool, standardisation of locomotive types, establishment of the equipment trust system (based on the U.S.A. model), and perhaps the most spectacular, the design and introduction of the now familiar TEE express trains; all these have raised the standard of European railway service to heights not before achieved.

Den Hollander has never been too busy to meet his numerous friends from this country and all over the world, and to give them his help and advice whenever they have asked for it. Today, with his retirement and recently that of Louis Armand, the task they undertook, with their senior colleagues from other systems on the U.I.C., is well on the way to completion. In the story of European railways the name of Francis den Hollander will find a prominent place.

Mr. F. H. Jarvis, Assistant (Planning & Construction), Electric Traction Section, Chief Mechanical & Electrical Engineer's Department, Scottish Region, British Railways, who, as recorded in our February 27 issue, has been appointed Assistant (Electrical Engineering) North Eastern Region, served his apprenticeship with Pilkington Bros. Ltd. From 1933 to 1935 Mr. Jarvis was an Assistant Electrical Engineer with the North Eastern Electrical Supply Co. Ltd. He was appointed Control Engineer, London & North Eastern Railway, in 1935. Nine years later he became Technical Assistant to the Electrical Engineer, Gateshead, and, in 1947, was made Senior Technical Assistant. In 1951 he was appointed Senior Technical Assistant to the Mechanical & Electrical Engineer, Eastern and North Eastern Regions, Doncaster, and a year later became Electric Traction Engineer in the Tyneside area. In 1957 he was appointed Assistant (Planning & Construction), the position he now vacates. In this capacity he was concerned with the Glasgow Suburban Electrification Scheme.

Mr. H. W. T. Young, District Operating Superintendent, Crewe, London Midland Region, British Railways, who, as recorded in our February 27 issue, has been appointed District Traffic Superintendent, Chester, began his railway career as a passenger and goods clerk on the London Midland & Scottish Railway at Govilon, South Wales, in 1923. After experience in the District Traffic Superintendent's Office at Abergavenny and in the Control Office, Carnforth-Lancaster, Mr. Young was appointed District Signalmen's Inspector, Westhouse, in 1933. He became Yardmaster, Hasland, in 1936, and District Inspector, Skipton, in 1937. In 1938 he attended the inaugural course at the School of Transport, Derby. He became Assistant Stationmaster, Heysham Harbour, in 1940; Assistant District Controller, Birmingham (Saltley), in 1941; Yardmaster, Leeds, in 1945; Assistant to the District Operating Manager, Rugby, in 1948, and Assistant to the District Operating Superintendent, Crewe, in 1949. Mr. Young was appointed Assistant District Traffic Superintendent, Chester, in 1955, and District Operating Superintendent, Crewe, in September, 1957.

Mr. R. W. Jackson, District Commercial Manager, Edinburgh, Scottish Region, British Railways, who, as recorded in our March 20 issue, has been appointed District Goods Manager, Glasgow, joined the former North Eastern Railway in 1921. After serving at a number of stations, he entered the office of the District Passenger Manager, London & North Eastern Railway, Newcastle-on-Tyne, in 1932. In 1937 he was appointed Passenger Canvasser, Leeds, and, from 1939 to 1944, served in the headquarters and District Offices at York. In 1945 he became Deputy Chief Controller, Darlington, and, two years later, was appointed Assistant to District Operating Superintendent, Burntisland. In 1948 he returned to Darlington, North Eastern Region, as Goods Agent & Yardmaster and, in 1952, became Assistant to District Operating Superintendent, Darlington. A year later he was appointed Chief Freight Trains Clerk in the Operating Superintendent's Office, Scottish Region. Mr. Jackson became Freight Trains Assistant to the Chief Operating Superintendent in 1955; District Traffic Superintendent, Ayr, in 1956; and District Commercial Manager, Edinburgh, in February last year.

Mr. Martin Russell has been elected a director of the Rhodesia Railways Trust.

Mr. G. W. Dunkley has been appointed a Director of Westinghouse Brake & Signal Co. Ltd.

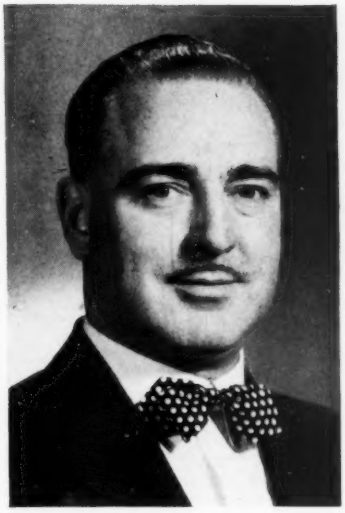
Mr. E. A. Webb, Sales Manager, Winn & Coales Limited, is making a business trip to the British West Indies. His itinerary includes, Jamaica, Trinidad, Barbados and the Venezuelan mainland. He will return to London in June.

Mr. W. M. C. Scott

Stationmaster, Glasgow Central, Scottish Region, 1951-59

Mr. R. D. Armstrong

Vice-President, Accounting & Finance, C.N.R., 1957-59



Mr. J. L. Toole

Appointed Vice-President, Accounting & Finance, C.N.R.

Mr. W. M. C. Scott, Stationmaster, Glasgow Central, Scottish Region, British Railways, who, as recorded in our March 6 issue, has retired, joined the former Caledonian Railway as a clerk, at Yoker, in 1909. He gained experience at stations in Lanarkshire and Dumbartonshire and, after serving in the Railway Operating Division, Royal Enginers, during the 1914-18 war, entered the District Superintendent's Office, Glasgow, in 1919. In 1924 he moved to the General Superintendent's Office, Glasgow, London Midland & Scottish Railway, and, in 1937, became Assistant Stationmaster, Glasgow Central. In 1940 Mr. Scott became Assistant District Controller, St. Rollox, and, two years later on the opening of the Control Office at Stranraer, he became District Controller there. He joined Motherwell Control Office in 1942, and remained there until, in 1948, he was appointed Assistant (Temporary) to the District Operating Superintendent, Glasgow, Scottish Region, British Railways. In 1950 he became Acting District Controller, Polmadie, and, in 1951, Chief Controller, St. Rollox. Mr. Scott was appointed Stationmaster at Glasgow Central in December, 1951.

Mr. H. C. Johnson, General Manager, Eastern Region, British Railways, has accepted the office of President of the Railway Students' Association for 1959-60.

Mr. G. Maurice Wells, Chief Engineer, Messrs. Livesey & Henderson, has been made a partner. The style of the firm will remain unchanged.

We regret to record the death, on March 23, of Mr. Harry Braybrooke, formerly of the Signal Engineers' Department, East Indian Railway.

Mr. D. D. Bartlett, General Manager, Malayan Railway Administration, and Chairman of the Railway Board, whose retirement was recorded in our March 20 issue, has been elected to the board of Anglo Auto Finance Co. Ltd. He has also been appointed General Manager of Gwent & West of England Enterprises Limited, a holding company with extensive transport interests.

Mr. R. D. Armstrong, Vice-President, Accounting & Finance, Canadian National Railways, who, as recorded in our February 20 issue, has relinquished his appointment to accept a senior position in another Canadian company, graduated from Queen's University with a Bachelor of Commerce degree, in 1937. He became a chartered accountant in 1941, and joined the C.N.R. in June, 1953, as Associate Comptroller. He became Comptroller the following April, and three years later was appointed Vice-president, Accounting & Finance. Mr. Armstrong has played a large part in the modernisation of accounting and other administrative operations on the system. The modernisation programme, directed by him, included the installation of advanced electronic data processing machines, and a computer centre at Montreal.

Mr. W. A. Griffin has been appointed Area Sales Engineer, South Wales, Industrial Gear Division, David Brown Corporation (Sales) Limited.

Mr. J. H. Sutcliffe Ross, Sales Engineer (Transmission), London Regional Sales, Metropolitan Electric Cable & Construction Co. Ltd., has been appointed Sales Manager, in succession to Mr. T. C. Johnston, now Director & General Manager.

Dr. J. N. Aldington and Mr. K. W. Marten have been appointed directors of the London Electric Wire Co. & Smiths Ltd. Mr. Marten will become Sales Director. Dr. Aldington is a director of Associated Electrical Industries Limited.

Mr. R. W. Asquith and Mr. J. D. H. Horobin, Chairman and Financial Director respectively of Asquith Machine Tool Limited, will join the board of Kitchen & Wade Limited on their return from a business trip abroad.

Dr. L. B. Pfeil, a director of Mond Nickel Co. Ltd., has been awarded the Platinum Medal of the Institute of Metals, in recognition of his outstanding contributions to non-ferrous metallurgical science and to the non-ferrous metal industries.

Mr. John L. Toole, Comptroller, Canadian National Railways, who, as recorded in our February 27 issue, has been appointed Vice-President, Accounting & Finance, was born at Guelph, Ontario. Mr. Toole graduated from the University of Toronto with a B.A. degree in Commerce and later took extension courses in business administration at McGill University. Before joining the C.N.R., in June, 1954, as Assistant Comptroller, he had been Assistant Comptroller of the Ford Motor Company of Canada. Earlier, he was with the Dominion Rubber Company in an executive capacity, and with Canadian Industries Limited. Mr. Toole, who has broad experience in accounting administration, financial analysis and machine accounting methods, became Comptroller, C.N.R., in May, 1957. He has played an important role in reorganising and modernising the railway's accounting operations, including the planning and installation of mechanical and electronic data processing equipment of the most advanced type. Mr. Toole is a Member of the Certified Public Accountants' Association of Canada.

We regret to record the death, in Australia, at the age of 58, of Mr. S. J. Angle, Consulting Field Engineer, attached to A. E. Goodwin Limited, licensees in Australia of Alco Products Inc., for the manufacture of diesel-electric locomotives.

We regret to record the death on March 26, at the age of 81, of Sir Ashley S. Ward, LL.D., President of Thos. Ward Limited; Chairman of the Park Gate Iron & Steel Co. Ltd.; Vice-Chairman of Laycock Engineering Co. Ltd., and a local director of the National Provincial Bank, Limited.

Mr. A. E. Jenner, Superintendent, Piggyback Services, Canadian Pacific Railway, has been appointed Assistant Manager; G. R. W. Partridge, Divisional Engineer, Toronto, becomes Superintendent, Piggyback Services, Montreal, and E. A. Moule, Assistant Superintendent, Montreal, becomes Superintendent, Piggyback Services, Prairie and Pacific Regions, with headquarters at Winnipeg.

NEW EQUIPMENT AND PROCESSES

Crane on Rail Chassis

THE KL 12-20R is the railway version of a new series of three 20-ton capacity cranes. Powered by a Perkins "Four 270D" diesel engine developing 62½ b.h.p., the crane has electric self-starting and variable speed control operated from the driver's cab. The fuel tank holds 15 gal.

Although the standard chassis is designed for 4 ft. 8½ in. gauge, other gauges can be provided. The railway undercarriage is mounted on eight driven wheels in two swivelling bogies. Bogies are spring-mounted, with spring locks for lifting. Railway-type buffers and drawgear are available for shunting purposes. Brakes are fitted on all four axles actuated from the driver's cab. An overriding brake control is fitted on the undercarriage to lock the travelling gear when the crane is not in use.

Hoisting performance is as follows: on single fall of rope—120 ft. per min.; on two falls of rope—60 ft. per min.; on four falls of rope—30 ft. per min.; on six falls of rope—20 ft. per min.

In lowering, the engine is controlled from a safe maximum of 45 ft. per min. (on six falls of rope) down to creeping speeds. The control gear can be easily disconnected to give greater lowering speeds for handling light loads.

Time for derricking from maximum to minimum radius is approximately 50 sec. Slewing is unlimited in either direction, up to a rate of 2½ r.p.m. Minimum negotiable curve is 80 ft. rad. Weight is approximately 50 tons.

The following equipment is optional: electric lighting, windscreen wiper, cab heater, audible and visual safe-load indicator, single or two-line grab equipment, magnet gear.

Further details can be obtained from the George Cohen 600 Group Limited, Wood Lane, Shepherds Bush, London, W.12.

Rotary Dividing Tables

THE "Ensign" is a new range of rotary dividing tables for horizontal mounting. Graduations are to 6 sec. of arc, using vernier; flatness of table is to within 0.0005 in.; working surface rotates in its own plane to within 0·0005 in.; deflection of table is 0·0005 in. maximum on locking, and outside rim of table is concentric with the axle of rotation, to within a distance of 0·0005 in.

Readings, in minutes, are positive and direct from the graduated dial. Dividing plates on three of the models provide fast setting for production work. Height of the table is only 4 in.

The tables are of Grade A cast iron with a high nickel content. The wormshaft is housed in an eccentric sleeve and is provided with phosphor bronze bearings and thrust races.

There are six models, three direct-reading and three index-plate types. Table diameters range from 10 to 15 in. for each type.

Further details can be obtained from A. A. Jones & Shipman Limited, Leicester, England.

Increased Range of Nuts

NYLOC self-locking nuts now are available up to and including 4 in. thread dia. and in all standard threads. The nut incorporates a nylon insert with internal diameter slightly less than bolt diameter and initially unthreaded. When the bolt thread reaches the insert the nut is forced away from the bolt head until working faces of threads are in close contact. Pressure results in heavy friction between the threads and anti-rotational force prevents the nut from moving under vibration. This is maintained as the bolt makes its own thread through the insert. Pressure between insert and bolt further increases locking characteristics. The nut is claimed to adjust well to thread irregularities. It possesses good dimensional stability under varying temperatures and humidities. It also is impervious to all oils and to boiling water.

Further details can be obtained from Simmonds Aerocessories Limited, Treforest, Glamorgan, and stockists throughout the country.

Miniature Instruments

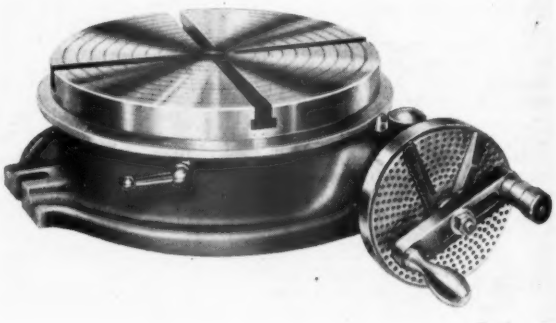
A NEW range of panel-mounting 240 deg. scale miniature instruments with 2 in. and 2½ in. dials has been developed which may be of interest for telecommunications equipment, measuring and test gear, and electronic process control gear.

The instruments are available for a.c. or d.c. measurements. Accuracy is high: the 2½ in. dia. models have a limit of inaccuracy of ±1 per cent. All models have 240 deg. scales, giving scale lengths of 3½ in. and 4½ in. Nine 3½ in. instruments can be mounted in a 6¾ in. square panel space.

Construction is robust, and the instruments can withstand high electrical, mechanical, and climatic stresses.

The range is available in moulded plastic or sealed die-cast metal cases.

Further details can be obtained from Crompton Parkinson Limited, Crompton House, Aldwych, London, W.C.2.



Magnetic Crack Detector

A NEW portable magnetic crack detector weighs 45 lb. and gives an output of 750A. It is fitted with a change-over switch allowing operating on 100-120 or 200-250V a.c. single-phase supply.

The carrying handle is located at the centre of gravity, and corner standing studs are fitted on base and side opposite the handle. Construction is robust. Price is £68 10s.

Black, grey, and red magnetic powders, a full range of coloured and fluorescent inks, and safe ultra-violet viewing lamps also can be supplied.

Further details can be obtained from Messrs. R. F. Fraser-Smith, 69, Kings Cross Road, London, W.C.1.

Inner Liners

INNER liners constitute a new railway application of aluminium, designed to protect boxcar walls against wear-and-tear during loading and unloading.

Extruded aluminium panels blanket wall areas to any desired height. An aluminium clip fastens the aluminium to the boxcar wall with blind rivets. Periodic painting is eliminated, and the system thus is virtually maintenance-free.

The liners are made of 6063-T6 alloy. Bottom panels are ¼ in. thick. Top sections are ⅛ in. Liners become a permanent part of the wagon, but can be removed and re-used when required.

Further details can be obtained from the Reynolds Metal Company, Grand Rapids, Michigan, U.S.A.

Pile Restoration

A NEW process, under test for more than a year in the United States, is claimed to build up and protect timber and concrete piles in jetties, piers, and wharves after serious erosion by termites or wave action. The process entails a coating of sand and cement to which Speed-Crete has been added.

On the Miami coast, a bridge and another structure supported by creosoted timber piles had been seriously weakened throughout the tidal range by Limnoria and Toredo wood borers. Between high- and low-water marks the original strength of many of these piles had been reduced by from 50 to 80 per cent. The reduction below low-water level was 2 to 5 per cent.

One pile in each bent of the bridge was cleaned at a time and hand-packed with the mortar and Speed-Crete coating. Altogether, 43 piles were so completely restored and another 45 slightly-damaged were coated. Reinforcement by light bars or wire was carried out in places to secure the mortar to the wood. The Miami Engineering Department and consulting engineers have expressed satisfaction with the results after a year's service.

In New Jersey, the concrete piles of a 1,000-ft. Long Branch pier were seriously damaged by wave-action. Here, also, Speed-Crete mortar was used. The fine spray was kept aimed at the varying waterline and, though scoured by each successive wave, each thin layer of mortar adhered firmly between impacts. Restoration below low-water level was completed by hand-packing. This method of treatment without any shuttering is very economical.

Laboratory tests showed that the mortar or grout had an ultimate compressive strength of over 6,000 lb. per sq. in. at 28 days. Three four-in. cubes broke at 6,450, 7,125 and 6,625 lb. per sq. in. respectively. Other tests showed 2,000 lb., 2,500 lb., and 3,000 lb. per sq. in. at 24 hr., 48 hr., and three to five days respectively.

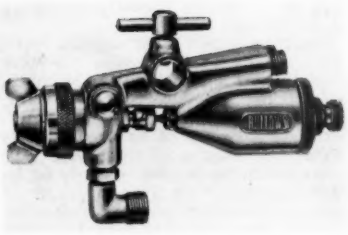
Traffic Barrier

A REMOTE-CONTROL electrically-operated traffic barrier has been designed which should be suitable for railway and pedestrian crossings. The standard model is supported on rolled-steel channel posts by self-aligning ball races in rigid plummer block housings. The 3-in. dia. 14 S.W.G. aluminium-alloy boom is counterbalanced by cast-iron weights and swings through a horizontal plane.

Also available is a barrier of 6 in. × 1 in. aluminium-alloy section complete with 1 in. × ¼ in. aluminium-alloy underlattice, which automatically folds flat as the barrier is raised.

Both models are powered by a totally-enclosed fan-cooled motor driving through a special double-worm reduction gear. Drive to the barrier spindle is via an overload clutch coupling adjustable to prevent damage should the barrier meet obstruction during descent. Special limit switches automatically cut off the motor at each end of travel. All driven mechanism is in a sheet-steel case on the main frame. Control is by push-button reversing starter with built-in isolator operated from the gatekeeper's office. The barrier also may be raised manually.

Further details can be obtained from Bolton Gate Co. Ltd., Waterloo Street, Bolton, Lancs.



Automatic Spray Gun

THE L540 is a new automatic spray gun which is claimed to be the fastest spray gun available. Of forged aluminium alloy, it weighs only 19½ oz. Internal component parts are interchangeable.

All hoses come away in the line of the gun, which is stated to be usable in positions and at speeds previously considered impossible.

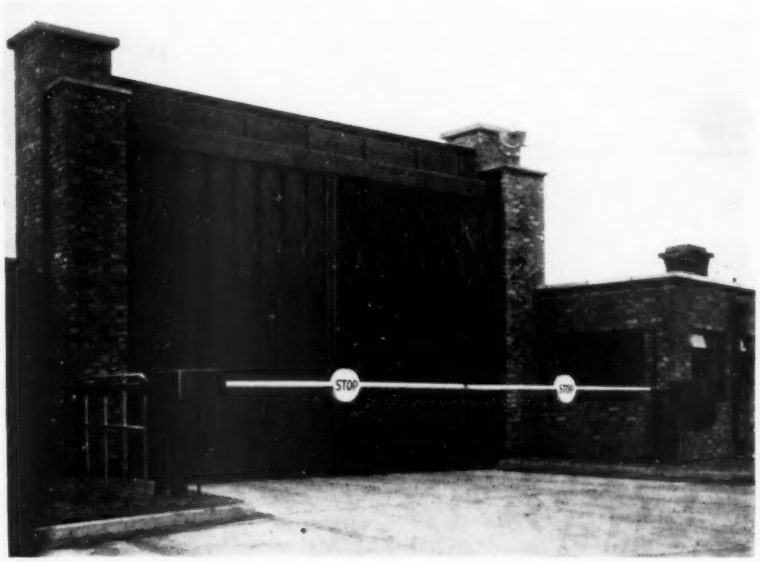
Nozzle set-ups are interchangeable with those used on the manufacturer's L1900 spray gun.

Price is £10 15s. plus 20 per cent. Delivery is seven days.

Further details can be obtained from Alfred Bullows & Sons Ltd., Long Street, Walsall.

Metallurgical Powder Dispenser

THE B.O.C. metallurgical powder dispenser has been designed for foundry melting shop, and general metallurgical use. It introduces fluxes to the



body or a melt to permit rapid and efficient reactions.

Desulphurisation with calcium carbide and recarburisation with powdered graphite are claimed to be technically and economically successful with the new treatment. Both these materials are injected by a stream of nitrogen.

The treatment may be carried out in ladles following melting, directly in high-frequency induction furnaces, and after melting or during storage in any other type of unit. Sulphur may be removed with calcium carbide virtually to any required value. Treatment time is about one or two minutes, depending on metal weight and degree of desulphurisation required. A dry, easily-removable slag is produced. There is no pick-up of nitrogen by the melt.

Recarburisation is effected by the use of graphite in a stream of nitrogen. The process normally is applied for the treatment of iron with an initial carbon content of at least 3 per cent. It is equally suitable for irons of lower carbon content. A final carbon of up to 4 per cent can be obtained quite rapidly. Efficiency of the carbon pick-up is high and can approach 100 per cent.

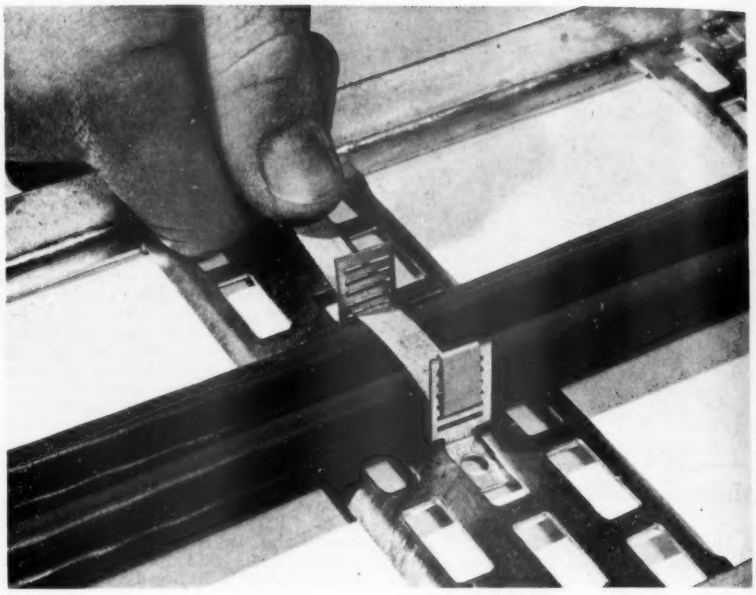
Capacity of the hopper is approximately 2 cu. ft.—150 lb. of calcium carbide or 100 lb. of graphite. It is not necessary to use the full charge in one operation. Discharge rate is up to 30 lb. per min. depending on pressure applied. The equipment can deliver gas or gas powder with selection by lever movement.

Further details can be obtained from the British Oxygen Co. Ltd., Bridgewater House, Cleveland Row, St. James's, London, S.W.1.

Self-Sealing Coupling

A NEW self-sealing coupling has been developed in which the opposing forces met with when connecting or disconnecting the two halves are practically balanced. Thus, quite large couplings can be connected at comparatively high pressures. The 3-in. coupling illustrated has been coupled without undue effort when pressure in the lines was 400 lb. per sq. in.

Further details can be obtained from Exactor Limited, Exactor Works, Church Way, Edgware, Middlesex.



Cable Tray

VIADEX is a new cable tray which cuts out the need for bends and sections, can be fitted flat to walls or ceilings, and is cheaper than the traditional tray. Accessories are Viadex cable clips, steel strap, and joining bar. The cable clip can be housed on existing trays.

The new tray enables the electrician to make his own curves, corners, junctions, and crossovers in any plane or direction. It will follow contours and projections and enables trunking to be fitted in tight corners with great precision. All work can be done from the front.

The slot pattern provides unlimited fixing points and allows the tray to carry more cable than conventional tracks.

Although the material is light and easy to cut and handle, construction is strong and rigid. Trays are available in 8-ft. lengths and 3-in., 6-in., and 8-in. widths. Finish is self-colour and galvanised.

Accessories are: cable clips, steel strap, and joining bar. The tray can be bolted direct on the manufacturer's slotted angle and partitions.

Further details can be obtained from Dexion Limited, Maygrove Road, Kilburn, London, N.W.6.

Metal Conditioner

PITAN Metal Conditioner combines with the application surface to become an integral part of the metal at one application. Because it forms an adhesive, and not a cohesive, film, it cannot become separated from the substrate. It cannot crack, chip, or flake.

It is effective on non-ferrous metals such as zinc, brass, copper, cadmium (on which it has an adhesion of over 3,000 lb. per sq. in.), aluminium alloys, and galvanised work. It is designed also for steel and other ferrous metals and particularly for shot-blasted, grit-blasted, and flame-cleaned steel where an early coating of anti-corrosive is required.

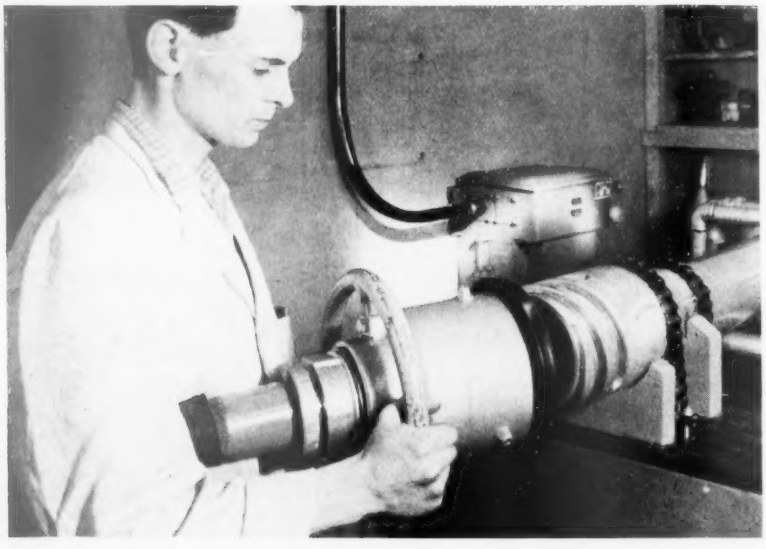
It is completely stable, does not "gell," and can be left in open pots or in spray equipment overnight without solidifying or skinning. With a high solvent resistance, it is suitable as a primer for most types of paint, including synthetic finishes, stoving enamels, and celluloses. It will withstand petrol.

It may be used on metals which subsequently will be welded. It leaves little ash and will cause no obstruction in the weld. It does not give off obnoxious fumes during welding. The dried film of the conditioner is non-toxic. It can withstand temperatures up to 200 deg. C.

Covering capacity is 60 to 80 sq. yd. per gal. approximately, and according to surface. Drying takes place in about 20 to 30 min. in all weathers. It may be stoved.

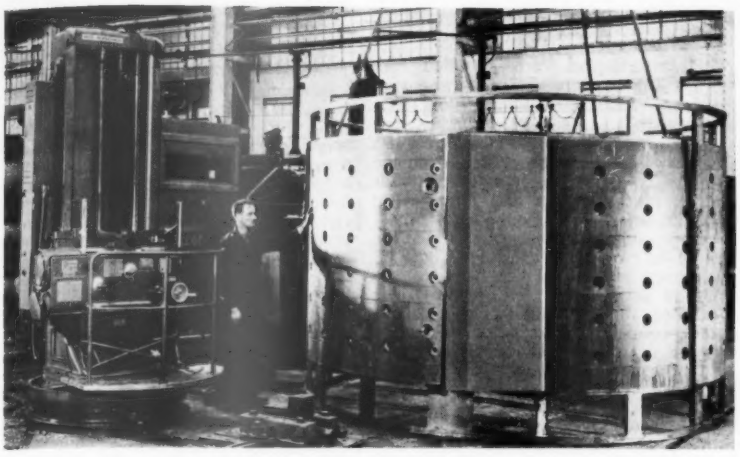
The conditioner will withstand outside exposure and will protect ferrous metals for periods up to 18 months and non-ferrous metals up to a year. It is not effective on lead, and unsuitable for non-metallic substances or for any existing painted surface. Flashpoint is below 73 deg. F.

Further details can be obtained from Allweather Paints Limited, 36, Great Queen Street, London, W.C.2.



Transportable Milling and Boring Machine

Economy of floor space and reduced number of lifting operations when making large magnet frames



A magnet frame lifted off the machine on left, which is itself transportable

In the Rugby factory of Associated Electrical Industries Limited, Heavy Plant Division, the large size of many of the components and of the machine tools for production operations necessarily occupies a great deal of valuable floor space.

Among the parts which must be machined are the magnet frames for large d.c. motors and generators, ranging in size up to about 15 ft. internal dia. and 7 ft. long. The frames, after being bored and faced are drilled radially to receive the bolts which secure the pole pieces.

For drilling the radial holes A.E.I. Heavy Plant Division has recently installed a transportable drilling, boring, and milling machine manufactured by Rigid Limited, Rorschach, Switzerland. The Rigid model BR500 machine has been specially developed for working inside cylindrical work-pieces having internal diameters from 59 in. to 197 in. While the machine is in operation it obviously takes up no additional floor space. When not in use the floor space occupied is only 53 in. × 53 in. The machine can be moved from one part of the factory to another, thus achieving the maximum possible usage.

Alternative Methods of Working

Either of two methods of working can be adopted. The machine can be left in place and the magnet frame lowered into position round it, or, alternatively, when a large number of frames are to be handled and floor space is fully occupied, it is preferable to lift the machine out on completion of the operation and lower it into the next frame on which work is to be carried out. With the machine removed assembly work can be carried out without moving the frame—this would not be possible if stationary machine tools were used.

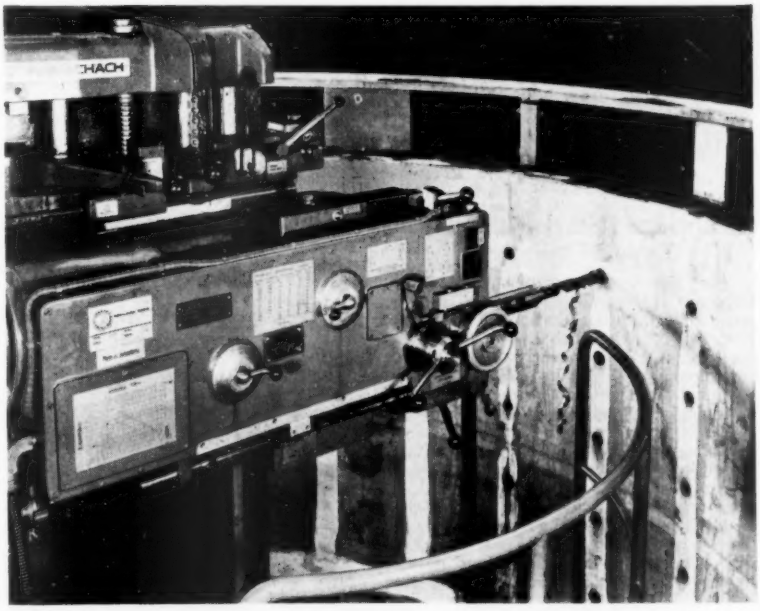
The illustration shows a magnet frame of 149½ in. outside and 133½ in. inside dia. for a 3,000-h.p. motor for a twin-motor rolling mill. There are 14 main and 14 commutating pole-pieces spaced alternately round the inside of the frame, each secured by a row of six bolts. The holes for securing the main poles are 1¾ in. dia. counterbored 3½ in. dia. by 1¾ in. deep on the outside to receive the bolt heads, and those for the commutator poles 1½ in. dia. counterbored 3⅛ in. dia. by 1½ in. deep. The tolerance on centre distance from a datum hole is ·010 in. Counterboring is performed by running the boring bar through the drilled hole, inserting the boring tool from the outside, and engaging reverse feed. Owing to the curvature of the outside dia. the initial cut is intermittent, necessitating a fine feed. Tapping and milling also can be performed.

Rotation Through 360 Deg.

The base of the Rigid BR 500 is provided with a circular table which can be centred. The column can be rotated through 360 deg. by hand feed or quick power traverse, and can be set at any angle by means of a micrometer-adjustment and clamped in position. The spindle can be adjusted to any radius between 29½ in. and 98½ in. The spindle carrier can be moved vertically through a distance of 59 in. by hand feed or power traverse, the minimum spindle height from the lower face of the circular table being 21½ in. The longitudinal displacement of the entire spindle carrier is up to 27½ in. Axial movement of the spindle sleeve is 7⅞ in. and of the 2 9/16 in.-dia. boring spindle, 17¾ in.

Power is provided by a two-speed flange-type motor of 5·6 h.p. mounted in the spindle carrier. Lubrication of the spindle carrier is automatic. There are 32 spindle speeds from 9·5 to 1,356 r.p.m. and 20 boring and fast feeds from ·12 in. to 7·85 in. per min. There are also 20 vertical and horizontal milling feeds from ·35 in. to 23·6 in. per min. All controls are within easy reach of the operator who stands on a platform which is raised, lowered, and rotated with the spindle carrier. The overall height of the machine is 124 in. and its net weight is about 12,800 lb.

BRISTOL SIDDELEY EXHIBITS AT OLYMPIA.—At the Engineering, Marine, Welding, & Nuclear Energy Exhibition at Olympia, London, on April 16-30, Bristol Siddeley Engines Limited will show Bristol Siddeley Maybach diesel engines, including an MD871/30 16-cylinder unit which, in rail-traction form develops up to 1,920 h.p. at 1,500 r.p.m., British Standard rating. Also there will be a 12-cylinder version, with the sump removed to enable the tunnel-housed disc-type crankshaft and roller main bearing arrangement to be studied. Other Bristol Siddeley exhibits include recirculating ball screws and splines, and gas bearings in which there is no metal-to-metal contact.



Control station of transportable drilling and boring machine mounted inside cylindrical work-piece

New A.E.C. Diesel Engine Rebuilding Plant

A new self-contained plant of 30,000 sq. ft. floor area at the A.E.C. Southall, Middlesex, plant of Associated Commercial Vehicles Limited, to concentrate the work of re-building used diesel engines for road vehicles and railcars, has a potential output of 100 engines a week. The engine-exchange service enables users to effect savings in valuation of spares stocks and in specialised machinery, workshop-cost overheads, and so on.

The labour force of 100 is sufficiently fluid, and the fixtures adaptable, to deal at one time with new and old designs of engines both vertical and horizontal. Many new parts including cylinder liners, pistons, rings, bearings, and valve guides invariably are fitted, and re-built units are brake-tested on Heenan & Froude dynamometers along with new engines from the production line at Southall Works. Each has a 12-month guarantee.

Cleanliness Ensured

Washing plant by Curran of Cardiff and immersion baths use Solvex manufactured by Fletcher Miller Limited to ensure the necessary degree of cleanliness for precision work. Herbert Morris electric hoists handle the complete engines. Before each engine loses its identity the crankcase/cylinder block units are examined and pressure tested and the crankshaft is subjected to current-flow and magnetic-flux tests on a Fel-Electric crack detector. Unsuitability for re-use of these major items increases the exchange price to the previous user.

Churchill precision grinders deal with crankshaft journals and pins. New steel-backed lead/bronze shell bearings are idium/lead flashed in the main works to a nominal thickness of ·001 in. after machining on a Krause borer supplied by Drummond-Asquith (Sales) Limited. Floor-to-floor boring time is reduced to one quarter of that required with conventional methods, while crankcase distortion is avoided by use of built-in three-point supports with slip-gauge height adjustment.

Heald Borematic machines bore small- and large-end connecting-rod bearings simultaneously. Sub-assembly work includes the fitting of cylinder liners by Mills hydraulic press with an exceptionally fine degree of control. Dry liners are honed after fitting, on a Kitchen & Wade machine.

The pits are equipped with both flood-lighting and plugs for wander leads. Also there is a compressed-air line for oil dispensers and portable hand tools. At the buffer-stop end of two of the roads, are platforms to facilitate the inspection and maintenance of diesel-shunting locomotives. The steel roll-shutter doors at the other end are electrically operated.

Heavy Engine Parts Handled

Other equipment includes overhead runways with pulley blocks for lifting items such as pistons and heads from the engines of diesel-shunting locomotives; steel pit bridges which fit on the pit edge and the nearer rail, for use with equipment for handling railcar engines and brake cylinders; mobile lubricating-oil dispensers; an air compressor; handy drip-trays which are clipped on to the rails at the site of operations; and scrubbing machines for floor and pit cleaning.

Included in the building are a fuel-injector room, a battery charging room, store-rooms, and workshops, also a mess-room and signing-on room for the staff. Outside the shed in the four-road yard, there are three fuelling points, one for shunting locomotives and two for multiple-unit trains. Fuel is metered from rail tank cars to two 10,000-gal. storage tanks.

Staff and Labour Matters

N.U.R. Wage Claim

The N.U.R. has submitted a claim through the official negotiating machinery for a substantial increase in rates of pay of all salaried and conciliation grade staff employed on British Railways. The claim presumably will be discussed at a meeting of the Railway Staff Joint Council, which is the first stage in the negotiating machinery. The claim has been lodged after pressure through the union's branches and District Councils on the Executive Committee.

An application for a substantial increase in pay for railway electrical technical and supervisory staff also has been made.

The London Transport Executive also has received a claim from the N.U.R. for a substantial wage increase for Underground railwaymen. A request also has been received from the Transport & General Workers' Union for resumption of negotiations on shorter working hours for bus crews.

Resolutions in favour of claims for higher pay for more than 200,000 busmen throughout the country will be considered by the National Passenger Services Group Committee of the Transport & General Workers' Union at its next meeting on April 14.

Redundancy and Transfer Arrangements Railway Workshop Staff

At a meeting of the Railway Shopmen's National Council held on April 6 consideration was given to proposed redundancy and transfer arrangements for railway shopmen employed on British Railways. Progress was made in the discussions and a further meeting has been arranged for April 15, when it is hoped to finalise the matter. Meanwhile, the position will be considered by the Confederation of Shipbuilding & Engineering Unions at its meeting in York this week.

Parliamentary Notes

Conveyance of Radioactive Materials

Dr. Edith Summerskill (Warrington—Lab.), during a discussion on an adjournment debate on radioactivity in Greater London, in the House of Commons on March 26, said that the previous day, when travelling by train to London, she had heard a guard refuse to accept a package of radioactive substance for conveyance in his van, on the ground that his instructions were not to convey such materials. Later the guard had said that he indicated that such packages were radioactive by drawing a chalk line around them in the van to a radius of 4 ft.

On arrival in London, Dr. Summerskill had consulted the regulations as to conveyance of radioactive substances. The relevant passages were:

" Packages to be segregated at least 4 ft., not only from undeveloped films, but also from articles of luggage, Post Office bags, and other packages the contents of which are unknown in trains or on station premises. Particular care must be taken to ensure that this traffic is not placed within 4 ft. of an adjacent passenger compartment."

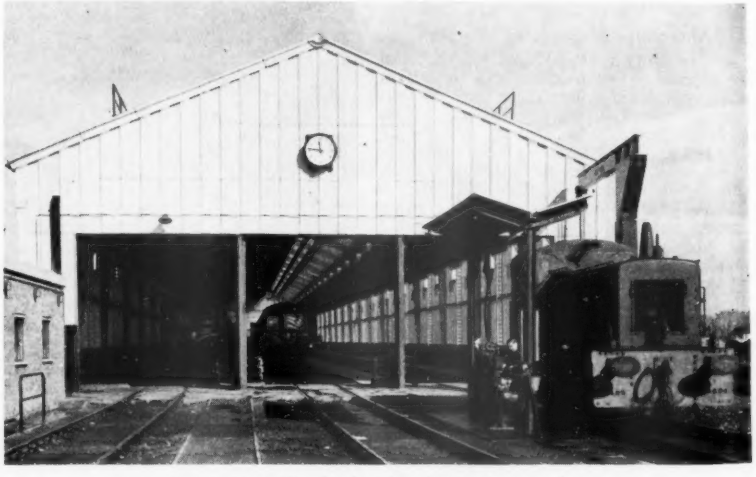
" In the majority of instances the most suitable arrangement will be to load the package in a corner of the train van at the buffer end. Where possible, a chalk line should be drawn on the floor indicating the required 4 ft. segregation."

" Owing to the possibility of dust on the

Cambridge Diesel Maintenance Depot Completed

The diesel maintenance depot near Coldham's Lane Bridge, about a mile north of Cambridge Station on the Great Eastern Line of British Railways, Eastern Region, is now operating a 24-hr. service for some 50 diesel power units based there. By June, the depot will be carrying out all periodical and mileage examinations for about 70 units including diesel multiple-unit trains, railbuses, and diesel-mechanical and diesel-electric shunters.

The steel-framed building is 510 ft. long and 60 ft. wide with three roads, each with side-access pits in addition to the pits between running rails. It will hold nine two-car sets in clear. Good natural lighting is ensured by extensive glazing in the sides and roof of the building. Space heating is provided and there is natural-type roof ventilation. The staff numbers about 100.



Entrance to Cambridge diesel maintenance depot

floors of vehicles becoming highly activated, the vehicle's floor should be swept before radioactive traffic is loaded."

Passengers, including children, she said, had passed through the van in the train. She saw a blur of chalk on the floor of the van. This, no doubt, related to previous carriage of radioactive substances. She did not blame the railway officials, who were complying with instructions. Here was a danger to the public which could not be seen. It might perhaps be said that there was only a little radioactivity connected with a parcel, as from a luminous watch, television, or from granite walls, but the cumulative effect was the real danger.

Mr. Reginald Maudling, the Paymaster-General, explained that the question of radioactive substances dealt with by regulations issued by the Minister of Transport & Civil Aviation was one about which he had no responsibility and no brief, but he would be glad to look into it. They attached great importance to this matter, and the machinery both at Government and authority level for dealing with the problem was satisfactory.

Contracts and Tenders

Telecommunication contract for Crewe-Manchester electrification

British Insulated Callender's Cables Limited has been awarded a contract for the supply and installation of telephone cables for phases three, four, and five of the work in connection with the electrification of the Crewe-Manchester line, British Railways, London Midland Region. The value of the contract is some £250,000.

The British Transport Commission has placed a contract with Taylor Woodrow Construction Limited for the design and construction of a Continental perishable goods traffic building at Hither Green, British Railways, Southern Region. About 70,000 yd. of excavation and a similar amount of filling will precede the erection of a reinforced concrete-framed building, 1,000 ft. by 160 ft. A second storey, with a structural steel frame, will be supported on two-thirds of the main building. The contract, including ancillary buildings and the laying of some 4,000 yd. of siding track, is valued at £1,000,000 and will take two years to complete.

Sudan Railways has placed an order with Fuji Car Manufacturing Co. Ltd., Osaka, Japan, for some 30 3 ft. 6 in. gauge bogie tank wagons.

The Isca Foundry Co. Ltd. has received an order from the Ceylon Government Railway for points and crossings to the value of £35,000.

South African Railways & Harbours has placed an order with Clyde Crane & Booth (South Africa) Limited, the wholly-owned subsidiary company of Clyde Crane & Booth Limited of Gateshead, for 32 dockside-level luffing cranes. The value of the contract is £800,000.

Associated Commercial Vehicles Limited has received an order from British Road Services for 193 "Murcury" road vehicles. The total is divided between 128 10-ton short wheel-base motive units and 65 14-ton gross four-wheel load carriers.

British Railways, London Midland Region, has placed the following contracts:—

M. J. Gleeson (Contractors) Limited: reconstruction of bridges on Crewe-Warrington and Crewe-Chester lines

Leonard Fairclough Limited: reorganisation of car maintenance arrangements in the amenities block of the Birkenhead North and Central Carriage Shed

Northern Taroads Limited: tarspraying and road repair programme, 1959, Lancaster District

Johnson Bros. (Aylesford) Ltd.: tarspraying and road repair programme, 1959, Bangor (North Wales) District

Taroads Limited: tarspraying and road repair programme, 1959, London and Walsall Districts

Constable, Hart & Co. Ltd.: tarspraying and road repair programme, 1959, Manchester District

Kimbell (Road Construction) Limited: tarspraying and road repair programme, 1959, Northampton District

Northern Taroads Limited: tarspraying and road repair programme, 1959, Blackburn District.

British Railways, Southern Region, has placed the following contracts:—

Winter & King Limited: additional staff accommodation, Wimbledon Park

Dorman Long (Bridge & Engineering) Limited: reconstruction, Topsham, Clyst River Bridge

E. H. Curd & Co. Ltd.: new staff accommodation, Horsham

Quiet May Oil Burners Limited: conversion of oil fuel installation, St. Leonards (West Marina) boiler house

Aubrey Watson Limited: foundations to footbridges, Faversham/Whitstable, Birchington-on-Sea/Westgate-on-Sea.

Aubrey Watson Limited: construction of retaining wall, Sevenoaks

R. J. Barwick: construction of platform roofing and screen walls, Dover Marine Station

Maurice Hill Limited: internal renovations, Eastleigh Locomotive Depot

T. Couzens & Sons Ltd.: staff accommodation, Havant.

The Special Register Information Service, Export Services Branch, Board of Trade, has received a call for tenders as follows:—

From Sudan:

2 rail inspection cars.

The issuing authority is the Sudan Railways Stores Department. The tender No. is 1923. Tenders should be addressed to the Controller of Stores, Sudan Railways Atbara. Prices should be quoted on both f.o.b. and c.i.f. Port Sudan basis, and tenders should be valid for two months from closing date. The closing date is April 30, 1959. The Board of Trade reference is ESB/7928/59.

From Portuguese East Africa:

5,000 pairs of fishplates for 30 kg. per m. rails, low section, A.S.C.E.

The issuing authority is the Ports, Railways & Transport Department, Lourenço Marques. The tender No. is A/CFB/1/1-60/59. A provisional deposit of Esc. 10,000 must be made by tenderers. The closing date is May 11, 1959. Local representation is essential. The Board of Trade reference is ESB/7952/59.

From Formosa:

10 *tonnes* of structural steel bars, ¾ in. × 4 in. × 18 ft. long

2 electric capacitors, 100 kVAR. and 50 kVAR.

1 double drum slush hoist motor and magnetic starter, and spare parts

2 mine locomotives with diesel engine drives, plus spare parts

1,500 ft. of rubber air hose.

The issuing authority and address to which bids should be sent is the Central Trust of China, Purchasing Department, 68, Yen Ping Nan Road, Taipei, Taiwan (Formosa). The tender No. is 556. This purchase will be financed by the International Co-operation Administration (I.C.A.), the agency through which the United States Government gives economic and technical assistance to other countries. The closing date is April 29, 1959. The Board of Trade reference is ESB/8163/59/I.C.A.

Further details regarding the above tenders, together with photo-copies of tender documents, can be obtained from the Branch (Lacon House, Theobalds Road, W.C.1).

The Special Register Information Service, Export Services Branch, Board of Trade, has reported that the closing date of the call for tenders from Iran for timber sleepers, reported in our issue of February 13, 1959, has been postponed to April 21, 1959.

Notes and News

Institute of Transport Informal Luncheon.—Mr. G. R. H. Nugent, Parliamentary Secretary, Ministry of Transport & Civil Aviation, will be the principal guest at the informal luncheon of the Institute of Transport, to be held at the Connaught Rooms, Great Queen Street, London, W.C.2, on April 28, at 12.30 for 1 p.m.

Great Western of Brazil Railway Liquidators' Report.—In their report for the year ended October 31, 1958, the liquidators of the Great Western of Brazil Railway state that the agreement with one of the leading private banks in Rio de Janeiro to shoulder the company's remaining liabilities in exchange for the right to collect its remaining assets in the country has now been concluded. The company has received permission to make the fourth and final distribution to preferred and ordinary stockholders of 1s. per £10 unit. Payment will be made on May 1, 1959.

East African Railways Film Chosen for Harrogate Film Festival.—"Opportunities for Employment," a 30-min. black-and-white film made by East African Railways & Harbours Film Unit in conjunction with Gateway Film Productions, has been selected for showing at the second Festival of Films in the Service of Industry. The film, which is entered in the "Education and Training—Within Industry" category, surveys the careers to be found in the E.A.R. & H. administration. The Dunlop Rubber Co. Ltd. film on disc brakes, "The Power to Stop," also has been selected for showing. The festival will be held at Harrogate on April 21-24. A special award is being made to the film best calculated to promote British exports.

Details may be obtained from the Organising Secretary, 3, Portman Chambers, 7-9, Baker Street, London, W.1.

Wartime Bomb Found Near Waterloo Station.—A 2,000-lb. wartime German bomb was found on a building site near Waterloo Station, British Railways, Southern Region, last Tuesday. London Transport Northern Line Underground trains were halted and Hungerford Bridge was closed to trains leaving and entering Charing Cross Station while the bomb was rendered harmless.

Institute of Transport Brancker Memorial Lecture.—The 1959 Brancker Memorial Lecture arranged for April 13, has been postponed, at the lecturer's request, until Monday, September 14, when the lecture will be delivered by Captain E. V. Rickenbacker, chairman, Eastern Air Lines, Inc., on "World peace through air transportation."

New Railway Telephone Exchange at Crewe.—British Railways, London Midland Region, new railway telephone exchange will go into service on April 13, in the former Staff Hostel adjacent to Crewe Arms Hotel. It will replace the present exchange above No. 5 platform at Crewe Station, and will have an initial capacity for 600 automatic extensions and eight manual operators' positions. Extensions on the new exchange will be able to obtain their own local calls on the Post Office system, to dial a special number for the dictation of telegrams and to dial "999" for connection to Railway Fire, Police and Ambulance emergency services. The exchange was manufactured and installed by the General Electric Co. Ltd., under the supervision of Mr. E. G. Brentnall, Signal Engineer, London Midland Region.

Visit to E.A.R. & H. by World Bank Transportation Chief and Sudan Railways General Manager.—Mr. J. F. Main, Chief of the Transportation Division of the International Bank for Reconstruction & Development and Sayed Mohamed el Fadl, General Manager of the Sudan Railways, recently toured part of the East African Railways & Harbours system, accompanied by Mr. J. R. Farquharson, General Manager, E.A.R. & H. They visited the Western Uganda rail extension and Mombasa.

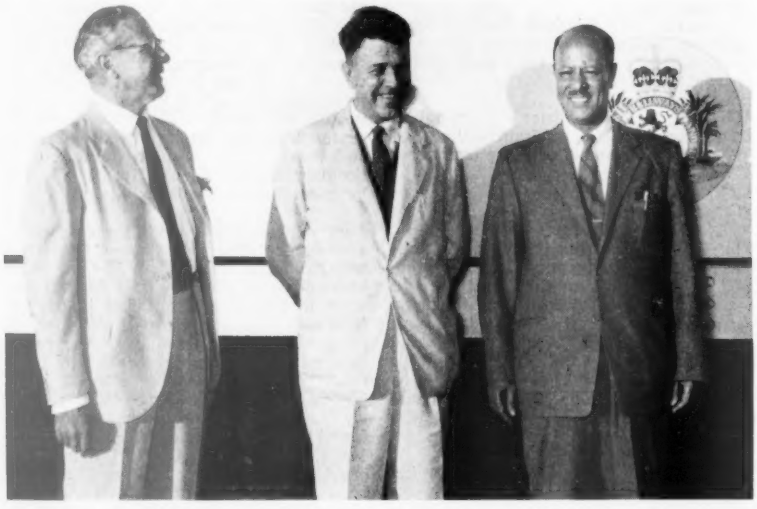
L.T.E. Accident Prevention Posters.—London Transport Executive recently issued the accident prevention poster reproduced in the accompanying illustration. It is to be displayed in permanent way messrooms and other premises used by the Underground permanent way staff. The poster is one of a series drawing attention to mishaps which can occur at work unless care is taken. Drawn by Mr. A. Gorton, of the L.T.E. railway operating staff, it shows the effects of incorrect posture in lifting a sleeper. The Accident Prevention Committee of the L.T.E. Permanent Way Department, formed five years ago, is drawing the attention of the staff to dangerous practices. Its measures taken include issue of a booklet, "Safety on the Track," to new members of the staff; the booklet already has been issued to existing permanent way staff. Since the committee was established, occupational accidents to permanent way staff have been reduced by one-half.

Pneumatics & Hydraulics for Industry Exhibition & Convention.—The first Pneumatics & Hydraulics for Industry Exhibition & Convention will be held at Alexandra Palace, London, N.22, between October 12-16, inclusive, this year. Hours of opening will be from 10 a.m. to 6 p.m. daily and admission (which will not be extended to the public) will be free, by ticket only. The convention will take place from 10.30 a.m. to 12.30 p.m. each day during the first four days of the exhibition. The inaugural meeting of the Fluid Power Association will be held in the Convention Hall on October 16. Working exhibits will be displayed in the outside demonstration area. Alexandra Park is 20 min. by car from Charing Cross. Free parking for 4,000 cars is available. Catering is provided at moderate prices. Basic cost of exhibition space is 12s. 6d. per sq. ft.; costs of specially-designed Shell stands are 7s. 6d. and 6s. 6d. per sq. ft., according to type chosen. Tickets can be obtained at 25s. per 500 by exhibitors for complimentary distribution. Posters, stickers, and direct mail leaflets will be supplied at cost. Further details can be obtained from the organisers, Macfarlane Watson Limited, 36, Beauchamp Place, London, S.W.3. Advertising agents are Arks Publicity Limited, 34, John Street, London, W.C.1.

One of a series of accident prevention posters issued by London Transport Executive

Locomotive Traverser for East African Railways & Harbours.—A locomotive traverser built for the East African Railways & Harbours, is undergoing load testing at the Reddish works of S. H. Heywood & Co. Ltd., before being dismantled and shipped to Nairobi. It is designed for metre and 3-ft. 6-in. gauges and can accommodate Garratt locomotives up to 260 tons gross weight. The traverser table has been load-tested with 260 tons of steel billets, simulating a locomotive, and a further 65 tons for the overload test. The total weight of the traverser structure and machinery is some 55 tons. It is believed to be the largest in the world.

Schoolboys' Study Courses in N.E. Region.—During the period April 6—15, parties of public and grammar schoolboys taking short study courses in the North Eastern Region of British Railways are seeing for themselves the many careers now open to them on British Railways. One party, with Darlington as its base, is visiting installations at Darlington, Shildon, York, South Gosforth, and Thornaby and studying mechanical, electrical, and carriage and wagon engineering. A second party, based at Whitley Bay, is studying the working of the Traffic Department, covering commercial and operating activities. Visits are being paid to stations, marshalling yards, signalboxes, and depots in the Newcastle area. Working from York, a third party is examining the work of the Chief Civil Engineer's department, including the maintenance and repair of permanent way, bridges and viaducts, coal shipping staiths, and the complete renewal of rails, switches and crossings. The boys in this party are visiting engineering installations in course of construction. The fourth party, based at York, is studying the work of the Signal Engineer's department. This course includes explanation and demonstration of train control by modern methods, and visits to signalboxes and new signalling and telecommunications



Mr. J. F. Main (left) and Sayed Mohamed el Fadl (right) with Mr. J. R. Farquharson during a tour of East African Railways & Harbours

installations. Besides seeing practical demonstrations the boys receive instruction by means of talks and films.

Birmingham Railway Carriage & Wagon Co. Ltd.—Net profit of the Birmingham Railway Carriage & Wagon Co. Ltd. in the year ended December 31, 1959, amounted to £95,836 (£63,014). The dividend is maintained at 10 per cent. Sir Bernard Docker, Chairman, has stated that orders for wagons have been very poor, but he hopes that there will be an improvement in the near future, because an increase in the carriage and wagon contracts would redress the production position and bring all the shops into line with the locomotive shops which are fully employed.

Superheater Co. Ltd. Results.—The total distribution on ordinary shares of the Superheater Co. Ltd., is 1s. 3d. a 5s. share on doubled capital with a final payment of 10½d. and a bonus of 1d. The previous year's total was 2s. 1½d. a share on the old capital. The trading balance was £850,914 (£678,610), before tax of £442,172 (£332,172). The directors state that part of the increased trading balance was accounted for by reason of the final settlement of a few large contracts outstanding for several years. The statement shows the result of the parent company only.

C.A.V. Exhibits at Engineering, Marine, Welding, & Nuclear Energy Exhibition.—Fuel-injection equipment and batteries, starter motors, generators, and control boards for diesel engines will be shown by C.A.V. Limited at the Engineering, Marine, Welding, & Nuclear Energy Exhibition at Olympia, London, on April 16-30. Exhibits will include a special design of fuel-injection pump supplied for the Napier Deltic engine and another of S.I.G.M.A. design, made by C.A.V. Limited for free-piston engine manufacturers in this country. Fuel-oil filters of the paper-element type and transistorised fluorescent lighting units for railway use also are to be displayed.

Turbo-charged Napier Deltic 18 Engine to be Exhibited at Olympia.—Among the exhibits of D. Napier & Son Ltd. at the Engineering, Marine, Welding, & Nuclear Energy Exhibition at Olympia, London, on April 16-30, will be shown for the first time in public a turbo-charged Deltic engine. This will be the 18-cylinder version capable of 2,300 h.p. at 1,600 r.p.m. traction rating. Also there will be displayed a model of the English Electric Deltic locomotive, a Napier M.S.100 turbo blower sectioned and rotating, precision castings, various research exhibits, and a Spraymat surface heater with electrical conductor element flame sprayed onto liquid-applied synthetic-resin insulation layers.

Closure of Line Between Little Weighton and Wrangbrook Junction.—British Railways, North Eastern Region, has announced that because of the financial loss which is being incurred, it has become necessary to withdraw the freight facilities and close the section of line between Little Weighton and Wrangbrook Junction, part of line generally known as the Hull & Barnsley line, from April 6, 1959. On the same date the goods depots at South Cave, North Cave, Wallingfen, Sandholme, South Howden, Barmby, Drax Abbey, Carlton Towers, and Kirksmeaton also have been closed. This measure has the approval of the Central Transport Consultative Committee and the Transport Users' Consultative Committee for the Yorkshire Area. Alternative facilities for freight and parcels traffic are available at Brough, Staddlethorpe, North Howden, Saltmarshe, South Eastrington, Goole, Drax Hales, Barlow, Wressle, Womersley, and Norton Stations. In addition, British Railways road motor services will operate on certain days each week in all the villages formerly served from the depots now being closed.

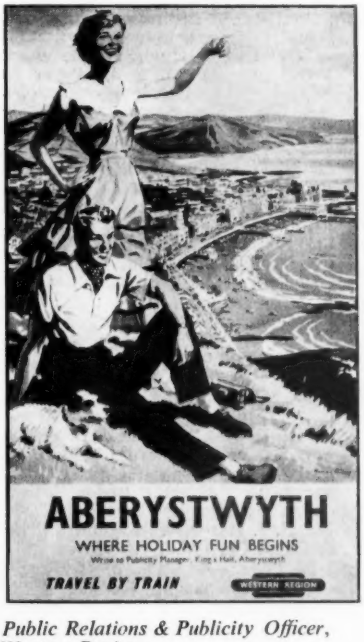
North British Locomotive Co. Ltd. Loss.—The North British Locomotive Co. Ltd. incurred a net group loss of £909,512 in 1958, and once again no preference or ordinary dividends are being paid. The preference payments are now in arrear from January 1, 1956, and the last ordinary dividend was the 5 per cent paid for 1955. The loss was arrived at after all charges, including tax, and after making special provisions against contracts of £100,000. In 1957 a net loss of £58,414 was incurred.

Short Works Course for Schoolboys at Doncaster.—British Railways, Eastern Region, arranged a short works course at Doncaster during the Easter holidays. Boys from public and grammar schools throughout the country have been given an insight into the workings of the technical departments. The course has been held this week in the Chief Mechanical & Electrical Engineers and Carriage & Wagon Engineers Departments at Doncaster. The programme included tours of the Doncaster Locomotive and Carriage & Wagon Works, Penistone Electric Control Room, and Reddish Car Depot. Lectures and discussion have been included. The course ends today (Friday) with visits to the Drawing Office and Photographic Department of the Chief Mechanical & Electrical Engineer at Doncaster.

Western Region Publicity.—The posters reproduced in the accompanying illustrations were produced by the Public Relations & Publicity Department of British Railways, Western Region. That depicting Barmouth was printed in six colours by Jordison & Co. Ltd. The artist is Henry Stringer. The artist of the Aberystwyth poster is Harry Riley, R.I. This poster was printed in 10 colours by E. J. Day & Co. Ltd.

Colchester-Clacton Electric Service.—With the introduction of electric operation between Colchester, Clacton-on-Sea, and Walton-on-the-Naze on April 13, the train service over the branch is to be nearly doubled. During the off-peak hours the general pattern will be electric trains at 17 and 41 min. past each hr. from Colchester to Clacton, with Walton portions detached at Thorpe-le-Soken. Most of departures at 41 min. past will be express, calling only at either Wivenhoe or Great Bentley between Colchester and Thorpe, and taking 26 min. to Clacton, 29 min. to Frinton and 32 min. to Walton. There will be 17 fast trains daily from Colchester to Clacton in 26-31 min. Connections at Colchester at hours other than those of the through London-Clacton services will be improved to give an hourly service from Liverpool Street to Clacton from 8.30 a.m. to 8.30 p.m.

Improved Lighting for L.T.E. Underground Stations.—At two of the busiest London Transport Underground interchange stations, Tottenham Court Road and Holborn, fluorescent lighting is being installed. Work is in progress at Tottenham Court Road, Central and Northern Lines, where 340 80-W. 5-ft. tubes are being installed along the four platforms, above the escalators, and in the subways and booking hall. To avoid interference with traffic, work is being carried out at night. It is expected to be completed by midsummer, and similar work at Holborn, Central and Piccadilly Lines, is then to be started and should be finished by the end of the year. At five East London Line stations, Whitechapel, Shadwell, Wapping, Rotherhithe, and Surrey Docks, the present lighting current is taken from the 600-V. d.c. traction supply and the lamps are connected in groups in series. New feeder cables, lighting circuits and



Two products of the Department of the Public Relations & Publicity Officer, British Railways, Western Region

additional fittings are being installed and the lighting system will be fed by the standard lower-voltage a.c.

Hudswell, Clarke & Co. Ltd.—The new address of the Hudswell, Clarke & Co. Ltd. London office is 14, Howick Place, S.W.1, tel. Victoria 6786.

Ransomes & Rapier Limited at British Trade Fair, Lisbon.—Ransomes & Rapier Limited of Waterside Works, Ipswich will exhibit at the British Trade Fair on May 29-June 14 at Lisbon, on the stand of their Agents, Blandy Bros. & Co., Rua Vitor Cordon 31-1°, Lisbon, a Rapier 4 Standard Mobile Crane. It will be the first time this unit has been exhibited abroad. Diesel or petrol-electric power units are available and a unique feature claimed is the exceptional manoeuvrability which, with finger-light controls, makes it possible to work easily in congested areas. The lifting capacity is 8,000 lb. at 4 ft. clear outreach to a height of lift of 14 ft., or 3,600 lb. at 10 ft. 4 in. outreach. Total weight is 6·4 tons. Scale models and photographs will show the range of Rapier mobile cranes, fork trucks, walking draglines, concrete mixers, and water control equipment.

Forthcoming Meetings

April 13 (*Mon.*).—The Railway Club, at 320, High Holborn, London, W.C.1, at 7 p.m. Talks by Mr. N. McCracken and Mr. E. J. T. G. Bagshawe.

April 14 (*Tue*).—Permanent Way Institution, York Section, in the Railway Institute, York, at 6.45 p.m. Paper on "Snow clearances," by Mr. J. M. Hauer, Netherlands Railways.

April 15 (*Wed.*).—Institution of Locomotive Engineers, at the Institution of Mechanical Engineers, 1, Birdcage Walk, London, S.W.1, at 5.30 p.m. Paper on "Vehicle suspension and bogie design in relation to track conditions," by Mr. R. M. Hancock.

April 15 (*Wed.*).—Institution of Railway Signal Engineers, Manchester Section, at the Dining Club, Hunt's Bank, Manchester, at 6.30 p.m. Paper on "Colour-light signalling principles, including the application of C.T.C.," by Mr. D. G. Parker.

April 16 (*Thu.*).—Diesel Engineers & Users Association, at the Connaught Rooms, London, W.C.2. Annual luncheon.

April 16 (*Thu.*).—Institute of Transport, East Midlands Section, at Eastgates Court Hotel, Lincoln, at 1 p.m. Paper on "The road-rail problem," by Mr. L. A. Castleton.

April 16 (*Thu.*).—Model Railway Club, at Caxton Hall, Westminster, S.W.1, at 7.45 p.m. "Joint effort: The Story of a layout (Part 2)," a talk by Mr. P. D. McCann and Mr. H. Boucher.

April 27 (*Mon.*).—Institution of Railway Signal Engineers, Bristol Section, at Bristol Temple Meads Station, at 6 p.m. Annual general meeting and paper on "Modern trends in the design of signalling apparatus," by Mr. E. J. Harris, Westinghouse Brake & Signal Co. Ltd.

April 28 (*Tue.*).—Institute of Transport, at the Connaught Rooms, Great Queen Street, W.C.2, at 12.30 for 1 p.m. Informal luncheon. Principal guest: Mr. G. R. H. Nugent, Parliamentary Secretary, Ministry of Transport & Civil Aviation.

April 28 (*Tue.*).—Institution of Civil Engineers, at Great George Street, London, S.W.1, at 5.30 p.m. Paper on "A project for extending the Nigerian Railway into Bornu Province," by Sir Ralf Emmerson, Chairman, Nigerian Railway Corporation.

Railway Stock Market

The strength and activity which developed in stock markets on Budget considerations resulted in substantial gains in industrial shares. British Funds also strengthened. The ruse has been so substantial that it induced fears it may be followed by profit-taking, because sooner or later, sentiment in markets may come under the influence of general election uncertainties.

Foreign rails did not participate in the upswing of markets, but elsewhere, Canadian Pacifics have been inclined to strengthen on consideration of the annual report, which emphasised the attention given to increased efficiency with a view to offsetting the effects of rising costs. Canadian Pacifics at $54\frac{3}{4}$ were fractionally higher than a week ago, while the 4 per cent debentures improved from $65\frac{1}{4}$ to $65\frac{3}{4}$. White Pass shares changed hands around $13\frac{3}{4}$.

In other directions, Nyasaland Railways shares strengthened to 13s. the $3\frac{1}{2}$ per cent debentures were $61\frac{1}{2}$. West of India Portuguese capital stock was quoted at $105\frac{1}{2}$ and the 5 per cent debentures at $91\frac{1}{2}$. Barsi ordinary stock was 24. Emu Bay Railway 5 per cent irredeemable debentures have changed hands at 22.

Among foreign rails, Antofagasta ordinary stock was 12 and the preference stock at 26 was also fractionally below last week's price: the 4 per cent perpetual debentures were 35 and the 5 per cent (Bolivia) debentures $86\frac{1}{2}$xd. Brazil Railway bonds were $6\frac{1}{2}$ and Costa Rica ordinary stock $13\frac{1}{2}$, while Chilean Northern 5 per cent debentures were 55. International of Central America preferred stock was $108. Guayaquil & Quito assented bonds were $78\frac{1}{2}$. United of Havana second income stock kept at 6 and San Paulo Railway 3s. units at 2s.

G. D. Peters remained under the influence of the good impression created by the results, and were 27s. 6d. compared with 27s. a week ago. Gloucester Wagon 10s. shares were well maintained at 18s. $1\frac{1}{2}$d. Wagon Repairs 5s. shares firmed up from 9s. to 9s. 3d. and Beyer Peacock 5s. shares held their recent improvement to 8s. as did Charles Roberts 5s. shares at 11s. 3d. North British Locomotive at 9s. 9d. reflected the loss shown by the results, though the latter was not unexpected. Birmingham Wagon remained at 20s. 3d. at which there is a yield of $9\frac{5}{8}$ per cent on the basis of last year's 10 per cent dividend.

Westinghouse Brake shares strengthened from 42s. 9d .to 43s. and in other directions, British Timken were good with a sharp advance to 73s. though later, there was a reaction to 71s. 6d. which, however, compared with 66s. 9d. a week ago. Babcock & Wilcox have risen from 50s. to 53s. with the upward trend of markets, while Vickers showed a rise from 31s. 6d. to 33s. Renold Chain moved up from 43s. 9d. to 44s. 6d. and elsewhere, Stone-Platt Industries on the latest news of the progressive policy being followed by the group, gained 1s. at 45s. $4\frac{1}{2}$d. Associated Electrical were good, having risen from 55s. to 57s. 3d. in anticipation of Lord Chandos's speech at the annual meeting. General Electric rallied from 31s. 9d. to 34s. 3d. and English Electric gained 1s. 3d. at 65s. 3d. Crompton Parkinson 5s. shares firmed up from 13s. to 13s. $4\frac{1}{2}$d. and British Oxygen at 55s. 9d. were also higher on balance. Dowty Group 10s. shares have advanced from 40s. $1\frac{1}{2}$d. to 42s. 3d. and Pressed Steel 5s. shares were 26s. $7\frac{1}{2}$d. B.I. Cables gained 1s. at 49s. 3d. Federated Foundries shares were higher at 35s. 6d. and T. W. Ward rose to 86s. 6d. Tube Investments were 82s. 6d. and Ransomes & Marles 5s. shares 17s. 3d. Murex moved up sharply to 50s. Steel shares remained an active feature with Stewarts and Lloyds up to 30s. and United Steel 31s.

OFFICIAL NOTICES

APPLICATIONS are invited for a SUPPLIES AND CONTRACTS MANAGER in each of the Eastern and North Eastern Regions of British Railways. The commencing salary payable would be within the range of £2,500 to £3,000 per annum. The Eastern Region post would have headquarters in London and the North Eastern post in York. Applicants should have sound negotiating ability, together with knowledge and experience of commercial practice and, while not essential, it is very desirable they should also have technical qualifications.—Applications should, in the first place, be submitted to the Regional Establishment and Staff Officer, Eastern Region, British Railways, Liverpool Street Station, London, E.C.2.

THE NIGERIAN RAILWAY CORPORATION invites applications for the following posts:—

(*a*) MOTIVE POWER OFFICER.
(*b*) ASSISTANT ELECTRICAL ENGINEER.

Qualifications and Duties: Post (*a*): Candidates must have served an apprenticeship, graduateship or diploma course or pupilage with a Railway Company or Locomotive manufacturers, with subsequent experience on a railway. Candidates should have had extensive experience in both utilisation and repair of locomotives and must have 5 years' experience in motive power organisation in the locomotive running section of a railway with knowledge of machine and repair shop methods and be capable of controlling staff and labour. Experience in Diesel maintenance and utilisation an advantage. Candidates must possess A.M.I.Mech.E. or A.M.I.E.E., or be graduates thereof. They would be responsible for assisting in the supervision of locomotive utilisation, failure, water and coal supplies, lubrication and the employment of enginemen.

Post (*b*): Candidates should have experience of planning, construction and commissioning of (*a*) small diesel-engined Power Stations, (*b*) High Tension and Low Tension distribution schemes with both overhead and underground systems, (*c*) Workshop lighting and power schemes, (*d*) conduit wiring systems, (*e*) Railway yard floodlighting schemes. A knowledge of water supply systems would be an advantage. They should preferably be Associate Members of the Institution of Electrical Engineers or possess a degree recognised as granting exemption from Parts I and II of the Institution of Electrical Engineers' examination and have five years' suitable experience. The officer will be required to take charge of minor Capital Works projects on the Railway, responsible to the Electrical Engineer.

Salary: In scale £1,100 by £50 per annum to £1,900 per annum (inclusive of Overseas Pay). Starting salary according to qualifications and experience. Appointments to post (*a*) may be on pensionable terms or on contract with gratuity. Appointments to Post (*b*) will be on contract with gratuity only. In both cases of contract appointments, the gratuity payable on completion will be at the rate of £18 6s. 8d. to £31 13s. 4d. for each completed month of service.

Tours: 15 months in Nigeria followed by 15 weeks' leave on full pay.

Quarters: Partly furnished quarters are provided at low rental.

Allowances: There are attractive family, travelling, transport and other allowances.

Send postcard before 27th April, 1959, mentioning the post and this paper for further particulars and application form to: The London Representative, Nigerian Railway Corporation, Nigeria House, 9, Northumberland Avenue, London, W.C.2.

RAILWAY TURNTABLE. For sale, Mundt type standard gauge turntable, 65 ft. long, carrying capacity 150 tons approx. WATER CRANE, 3,000 gallon Water Crane. TURNOUTS. Twenty 1 in 8 Turnouts, in 75 lb. F.B. rail; interchangeable to suit LH or RH. All these items are in excellent condition. Apply Eagre Construction Co. Ltd., East Common Lane ,Scunthorpe, Lincs. 'Phone: 4513